

STATE OF MAINE
PUBLIC UTILITIES COMMISSION

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PUBLIC UTILITIES COMMISSION
Inquiry into the Response by
Public Utilities in Maine to
the January 1998 Ice Storm

ORDER

Welch, Chairman; Nugent and Diamond, Commissioners

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I. SUMMARY

A. Overview

A severe ice storm occurred in Maine during January 1998, leaving most homes and businesses in Maine without utility services. In some areas, homes and businesses were without service for over three weeks. On January 21, 1998, the Public Utilities Commission began an Inquiry into the response by Maine public utilities to the storm. This Order concludes this Inquiry and describes the ice storm and its effects on utilities and customers. The information in this Order is based in part on material provided by utilities, including their own internal assessments of the storm. Some utilities commented that the assessments and reports they undertook for the Commission yielded significant internal benefits. The recommendations contained in the utilities' own reports are almost uniformly correctly focused and appropriate, and we encourage the reporting utilities to adopt the recommendations made in their own internal assessments.

The utilities' reports reflect examples of innovative and creative responses by utility personnel to difficult situations. We suggest that all utilities share with each other their experiences and recommendations; this sharing should not only take place among like utilities (e.g., among Maine telecommunications utilities), but also among all public utilities in the state, including those not affected by the ice storm. We commend utility personnel, not only for their response to ice storm damage and service interruptions, but for their evaluations and thoughtful recommendations.

This Order describes reported effects of the ice storm, and recommendations for further actions. Most follow-up activity can be pursued through discussions with utilities and utility associations, limited changes to the Commission's rules and policies, and improved Commission capabilities. In some cases (e.g., utility line clearance practices and communications with customers), further non-adjudicatory inquiry is necessary to resolve outstanding issues. We have reviewed numerous recommendations related to ice storm response and mitigation prepared by others on federal, regional, and state levels, and have evaluated how the Commission could appropriately address those recommendations. We have not found any grounds for us to conduct a subsequent formal investigation into any aspect of Maine utilities' response to the January 1998 ice storm.

The magnitude of the storm and restoration efforts overwhelmed most utilities' previously-developed emergency restoration plans. Faced with this significant challenge, most utilities exercised portions of preexisting plans and improvised

where those plans did not address the full dimensions of the storm recovery effort. The lessons learned and experiences gained during the January 1998 ice storm should be captured and incorporated into future utility and government preparedness. This Order summarizes actions taken by utilities and incorporates recommendations that we believe may assist utilities in dealing with future events of this magnitude and capturing lessons learned from this event.

This Inquiry included analysis of reports provided by affected utilities, utility response to Staff inquiries, and comments received from public officials and members of the general public. Much of the analysis is based on information provided by the utilities most severely affected by the storm: Central Maine Power Company (CMP), Bangor Hydro-Electric Company (BHE), Bell Atlantic - Maine (BA-ME), Eastern Maine Electric Cooperative (EMEC), and a number of water and independent local exchange carrier telephone utilities. A complete list of entities providing reports or comments is included as Appendix A to this Order.

B. Summary of Recommendations

Recommendations and actions planned by the Commission are detailed throughout the body of this Order. The recommendations cover a broad range of issues, some applicable to all public utilities, some to a class of utilities, and some only to individual utilities. We recognize that resources may not be available to address all recommendations immediately. Accordingly, organizations must prioritize and address these recommendations on a case-by-case basis, reflecting local priorities and available resources.

Our recommendations and planned actions are briefly summarized below, with reference to where those recommendations appear in the body of this Order. The order in which these recommendations are listed does not reflect any suggested priority for their implementation.

1. Actions Planned by the Commission

a. amend Chapter 130 to require utilities to maintain and test emergency restoration plans (ERPs) (III-8); and to address major storm notification and clarify "critical facility" provisions (III-14); amend Chapter 20 to reflect supplemental Chapter 130 notification (III-15)

b. conduct inquiry on targeted line clearance approach using consultant assistance (III-10); evaluate need to amend legislation or rules (III-13)

c. ask NARUC to request NESC to consider creating a "very heavy" ice loading category for pole and line design (III-11)

d. amend Chapter 32 to set standard system reliability measures and incorporate reporting provisions (III-16)

e. standardize major storm exemptions from service quality indices (III-17)

f. convene Staff meeting with DVEM/MEMA, DHS, and water utility representatives to eliminate duplication of effort (IV-6)

g. expand electronic notification capabilities (IV-7); expand GIS capabilities (IV-9)

h. conduct an inquiry into communications between utilities, customers, government, and the media during major outages (IV-21)

i. consider standard criteria for designation of Life Support customers (IV-30)

j. ask NARUC to task a committee or affiliate to address interdisciplinary reliability issues (V-5)

2. Recommendations for Consideration by Other Agencies

a. Department of Defense, Veterans & Emergency Management

i. resolve conflicts between transportation and utility needs during emergencies (II-1)

ii. incorporate utilities into drills and exercises (III-7); include utilities in emergency planning processes (V-2)

iii. establish requirements for utility notification when critical services are interrupted (IV-4)

iv. assume lead responsibility for developing a model emergency plan and training program for local government communication of damages to utilities (V-3)

c. Department of Environmental Protection

i. assume lead responsibility for requiring wastewater systems to maintain backup power (V-4)

3. Recommendations for All Public Utilities

a. develop contingency plans for loss of utility-provided power (II-2) and for loss of telecommunications used for customer contact (IV-22)

b. incorporate law enforcement contacts into ERPs (II-3)

c. assess existing ERPs based on ice storm and Hurricane Gloria and Bob experiences (III-1); develop and maintain written ERPs (III-2); address backup generation issues in ERPs (III-3); make ERPs available to PUC upon request (III-5); periodically test ERPs (III-6); incorporate alternate communications methods for major outages in ERPs (IV-12)

d. arrange to receive severe weather alerts (IV-1)

e. establish emergency liaison procedures with emergency management officials (IV-3)

f. evaluate needs to safeguard infrastructure information (IV-10)

g. integrate different computer systems to support provision of information to emergency managers (IV-8); develop standard GIS protocol (IV-11)

h. install backup power for facilities needed to restore service (IV-15)

i. test automated outage reporting systems to ensure report calls are not lost (IV-16); check systems to ensure user-friendliness (IV-17)

j. improve provision of restoration information to customers (IV-19); arrange to provide restoration information "live" to the extent possible (IV-20); make greater use of division personnel (IV-23) and volunteers (IV-24) to provide

restoration information; give customers better restoration information (IV-27)

k. simplify outage reporting databases (IV-26)

l. develop standard procedures for communicating with Life Support customers (IV-29)

m. use "accounts" or "meters" (rather than "customers" when describing outage extent to media (IV-31)

n. (>\$10M ann. revs.) evaluate disaster loss insurance (V-1)

o. evaluate the need to protect utility infrastructure information in emergencies and seek appropriate protection (IV-10)

4. Additional Recommendations for Electric Utilities

a. develop programs to assess root causes of pole failures (III-9)

b. monitor undergrounding projects in other areas (III-12)

c. (CMP, MPS, EMEC) notify DVEM and PUC when regional power emergencies are declared (IV-5)

d. notify BA-ME and TAM when power emergencies are encountered (IV-13)

e. develop contact methods for other utilities during emergencies (IV-14)

f. eliminate practice of purging customer outage report systems during restoration (IV-18)

g. reattach service entrances during major storms where possible (IV-28)

h. adverse DVEM of highway and road crew conflicts (II-1)

5. Additional Recommendations for Water Utilities

a. install and maintain backup power for supply, treatment, and booster stations (II-4)

b. install and maintain backup source of water supply (III-4)

6. Additional Recommendations for Telephone Utilities

a. advise DVEM of highway and road crew conflicts (II-1)

b. develop programs to assess root causes of pole failures (III-9)

c. monitor undergrounding projects in other areas (III-12)

II. BACKGROUND

This section of the Order describes the January ice storm that led to the interruption in utility services, how that storm affected utility infrastructure, and specific damage sustained by utilities.

A. The Storm

Freezing rain, freezing drizzle, and sleet developed over parts of New York, Vermont, New Hampshire, Maine, Ontario, Québec and New Brunswick on Monday, January 5, 1998 and continued through Friday, January 9. The precipitation resulted in ice accretions of as much as four inches in parts of Québec. Mixed precipitation again developed over Maine on Tuesday, January 12, followed by a cold front with strong and gusty winds. Snow fell across most of the State from Sunday, January 18 through early Tuesday, January 20.

Additional snow developed in Maine on Friday, January 23, changing to sleet and freezing rain in southern and central Maine before ending on Saturday, January 24. This resulted in additional significant icing along the southwestern coast of Maine.[1] Ice accretions well over one inch were measured in some areas of central and coastal Maine.[2]

While the event may be the Maine's worst ice storm, it is not without precedent. In December 1929 an ice storm extended from western New York into Maine, causing tree and aerial line damage comparable to this storm, and winter weather experts expect storms of similar magnitude every 40 to 90 years.[3] It is thus important to recognize that the Ice Storm of 1998 was not "unprecedented," and is likely to reoccur. Utilities and government agencies affected by the ice storm should learn from

their own and others' experiences, so that the effects of future storms can be lessened or mitigated.

B. The Results

The ice storm severely damaged public utility lines, poles, and transformers in Maine and throughout the region.[4] The ice caused moderate to heavy damage to about 3.5 million acres of Maine forest trees,[5] resulting in significant damage to utility lines, poles, and transformers when limbs and trees collapsed under the weight of accumulated ice. The ice accumulations also directly damaged utility poles and lines. The storm affected services provided by electric, telecommunications, and water utilities to about 700,000 persons, businesses, and governments in most areas of Maine, affecting more than half the state's population. Some services, principally to seasonal homes, were not restored for about 40 days. Most damage from the ice storm occurred between January 7 and January 9, 1998. Maine Governor Angus King described the ice storm as "the most cruel test Mother Nature could devise."[6]

C. Inquiry Process

The Public Utilities Commission, as the agency charged by the Legislature with ensuring the safety, reasonableness, and adequacy of utility services in Maine, opened an inquiry into the response by public utilities in Maine to the storm on January 21, 1998. In opening the inquiry, the Commission stated its intent to "determine whether any grounds exist for us to conduct a subsequent formal investigation into any aspect of this event."[8]

Shortly after the Commission opened the inquiry, the Commission Staff contacted major utilities affected by the storm, advising that the Staff wished to avoid any interference with utility restoration efforts, and to avoid any unnecessary duplication of efforts if utilities were already planning to perform internal storm-related reviews. The Staff suggested that utilities advise the Staff of the scope and timing of any internal reviews, assessments, or reports that were planned to address the effects of the storm so that the Staff's report could include analyses of the utilities' own evaluations to the extent possible.

During February, the Staff forwarded copies of several documents related to past storm assessments to major electric and telephone utilities and suggested that the utilities address a number of specific issues in their reports. The Staff prepared and sent questionnaires to the 24 local exchange carrier telephone utilities and the 155 water utilities regulated by the Commission. The water utility questionnaire is shown in Appendix E to this Order. The telephone utility questionnaire is included

as Appendix F, with a tabulation of the utilities' responses. The Staff requested that all utilities provide their reports and responses by March 31, 1998.

To solicit further input from interested government officials, the Staff requested the Maine Municipal Association to insert a solicitation notice in its monthly publication; that notice was published in the March 1998 issue of *Maine Townsman*. At Staff request, the Maine Emergency Management Agency of the Department of Defense, Veterans & Emergency Management advised all county and local emergency management agencies that the PUC would welcome utility-related comments from those agencies. The Staff held meetings with some utilities and groups of utilities to discuss specific issues, and participated in event reviews held by federal and state government agencies.

On September 21, 1998, the Staff filed a report of its inquiry. The Commission distributed that report to all public utilities, affected agencies, and other interested persons for comment. We received comments from four entities: Bangor Hydro-Electric Co., Central Maine Power Co., the Department of Defense, Veterans & Emergency Management, and the Maine Rural Water Association.

D. Direct Storm Damage

The storm severely damaged utility poles, lines, and transformers throughout southern, central, and eastern Maine, and affected services provided by many utilities. This section of the Order describes damage sustained by electric, telephone, water, and gas utilities.

1. Electric Utilities

Central Maine Power Company (CMP), Bangor Hydro-Electric Company (BHE), and the Eastern Maine Electric Cooperative (EMEC) experienced extensive damage to their transmission and distribution systems throughout their operating areas. Damage to these systems is described below. Madison Electric Works and the Kennebunk Light and Power District experienced less severe damage to their systems.

The Northeast Power Coordinating Council (NPCC) advised that high voltage transmission system operational criteria established by the NPCC and North American Electric Reliability Council (NERC) were followed, and that the storm did not jeopardize the integrity of the regional bulk power supply transmission system.[9] NPCC reported that the ice storm had no significant impact on generation in New England.[10]

a. Central Maine Power Company

Damage was widespread over most of CMP's service territory. The Maine Forest Service reported heavy to severe forest stand damage in CMP's Alfred, Oxford, Androscoggin, Augusta, Waterville, Farmington, and Rockland service areas. The weight of the ice on trees, wires, and poles, averaging one inch in thickness but as much as three inches in places, caused large portions of the distribution and transmission systems to collapse.

i. CMP Transmission

Thirty-seven transmission line sections, stretching about 500 miles across CMP's system, were out of service. Unlike Hydro-Québec, which lost sections of its bulk transmission system, only minor damage was sustained by the 345 kV bulk transmission system in Maine. One 345 kV transmission incident involved faults in the Maine Yankee area and affected one 345 kV tie between Maine and New Hampshire. These lines tripped due to temporary faults probably caused by ice buildup dropping off phase wires, taking the lines out of service on January 10. All these 345 kV lines were returned to service the same day.[11]

The storm affected the 115 kV and 34 kV lines that supply power to dozens of substations. The failure of 25 sections did not interrupt, or only briefly interrupted, service to customers because other, undamaged lines could be switched to serve the affected substations. This is a benefit of a "looped" transmission system design. The failure of 12 transmission line sections that were either radial lines or served substations that suffered damage to multiple feeds, however, caused some customers to be without power for prolonged periods.

ii. CMP Distribution

The storm rendered thousands of miles of CMP distribution lines and substations inoperative. CMP replaced more than 3,000 broken poles and more than 1,000,000 feet of cable/line. It reconnected thousands of customer service drops during recovery activities. At the peak of the storm, about 275,000 homes and businesses served by CMP (52% of its customer accounts) were without power. CMP had to restore service to some customers more than once when lines failed repeatedly as the storm continued over three days.

b. Bangor Hydro-Electric Company

BHE's system suffered significant damage from the ice storm. The worst damage occurred in the Bangor area and along Route 1 from Ellsworth to Eastport. The Northern Division

in the Lincoln and Millinocket areas was less severely impacted by ice but did receive heavy wet snow. The January 24 ice storm that affected CMP's southern regions did not strike BHE's service territory.

i. BHE Transmission

Damage to BHE's Line 66, the 115 kV radial from Veazie to Jonesboro, was especially severe. Helicopter inspection on January 10 revealed a 5.5 mile continuous stretch of the line flat on the ground. BHE was forced to rebuild, from scratch, over 9 miles of Line 66. The project was completed 29 days after the start of engineering on the new line, when BHE reenergized Line 66 on February 9. Before the line was restored, BHE arranged for portable diesel generators to provide 7 MW of power. BHE installed a temporary 15 MW transformer in Deblois to supplement its own Eastport diesels and a 34 kV line from Ellsworth to serve Washington and Hancock Counties.

Other transmission lines serving Old Town, Enfield, Brewer, and Lucerne suffered damage from trees and limbs, but BHE restored them within hours or at worst three days. The large paper mill customers (Bowater, Lincoln Pulp, and Fort James) remained in service for the most part during the entire storm. The Eastern Maine Electric Cooperative rearranged its own transmission system to supply power to 168 BHE customer accounts for a week, until BHE could restore its own facilities to those customers. BHE characterized its transmission-distribution-generation system as inadequate without Line 66 in service.[12]

ii. BHE Distribution

The ice storm that began on January 7 and ended late in the day on January 9th resulted in ice-coated trees and limbs that sagged onto or broke down wires and poles, devastating BHE's distribution system around Bangor and Downeast Maine through Hancock and Washington Counties. The damage was less severe, although considerable, north of Old Town.

c. Eastern Maine Electric Cooperative

EMEC's system was heavily damaged by freezing rain during the period January 8 - 10. However, the northern portions of EMEC's system in the Island Falls and Houlton areas escaped damage from this ice storm. Another ice storm, not the subject of this Order, caused considerable damage to EMEC's northern service areas in February.

EMEC's main 69 kV transmission line failed on January 10, rendering the entire interconnected system out of

service for 20 minutes before the line was sectionalized to restore power to the substations in Calais and Woodland. The substations in Princeton and Topsfield remained deenergized until midnight on January 10. Service to nearly 2,000 homes and businesses served by EMEC (17% of the utility's customer accounts) was interrupted due to damaged distribution feeders in the region from Princeton south through Woodland and Calais to Pembroke, and west to the Village of Leslie.

d. Other Electric Utilities

Madison Electric Works experienced ice damage but was able to restore service to all customers within 24 hours with its own crews. Six electric utilities were unaffected by the January ice storm: Maine Public Service Company, Van Buren Light and Power District, Swans Island Electric Cooperative, Houlton Water Company, and Fox Islands Electric Cooperative.

2. Telephone Utilities

Bell Atlantic - Maine (BA-ME) and a number of independent local exchange carriers sustained damage to telecommunications distribution facilities, most commonly customer service drop lines, although some utilities' interoffice facilities were also affected. Community Service Telephone Company reported that aerial communications lines that were hanging lower than usual due to ice accumulations were snagged and damaged or destroyed by high-profile vehicles (e.g., logging trucks) driving underneath. In some cases, customer service drop lines were cut during restoration of power lines to customer premises. This issue is described in more detail in Section IV.E.2 below.

Many telecommunications cables continued to function properly even though on the ground. Some of these cables, however, were cut by highway crews or other utilities engaged in restoration work. In at least one case, public safety officials directed that a downed communications cable be cut to facilitate traffic flow, although the cable was still in service. In this case, utility personnel on the scene convinced the public safety officials that the cable was providing essential services, and the line was not severed.[13] Similar situations were experienced in other jurisdictions.[14]

In its comments on this issue, the Department of Defense, Veterans & Emergency Management stated that "DVEM is willing to participate in a study group . . ." on this issue.

RECOMMENDATION II-1. We suggest that electric and telephone utilities advise the Department of Defense, Veterans & Emergency Management (DVEM) of any conflicting priorities between highway

and road crews during outage restoration activities, and that DVEM study these issues and develop standard practices and priorities for all responsible parties.

Services provided by a number of telephone utilities was also impaired due to the lack of commercial power, when batteries in field equipment such as digital loop carrier systems discharged. Indirect effects of the storm are described in Section II.E below.

3. Water Utilities

Water utilities generally reported no direct damage to their facilities or equipment. Some water utilities experienced hydrants broken by cars skidding on the ice, but none reported water main breaks during the storm. Many water utilities, however, reported indirect effects on their provision of service resulting from the lack of commercial power. Those effects are also discussed separately in Section II.E below.

4. Gas Utilities

Northern Utilities Inc. reported no damage to its facilities and no disruption of service during the ice storm. Customers with appliances equipped with electronic ignition devices and furnaces or boilers dependent on electric motors for heat circulation were unable to use these devices due to electric outages. As a precaution, Northern Utilities issued several public service announcements during storm recovery warning such customers not to attempt bypassing the electronic ignitions of these devices.

E. Indirect Storm Effects

In addition to direct damage to aerial utility infrastructure, the ice storm affected services provided by some public utilities in other ways. Principal among these was the disruption of services by telephone and water utilities resulting from the loss of commercial power.

1. Telephone Utilities

In some cases, telephone utilities experienced interruptions in service when backup batteries in field equipment discharged. At one point during the storm, BA-ME was supplying 380 equipment sites, principally digital loop carrier (DLC) equipment, via backup power sources. Similar problems were experienced in other jurisdictions during the ice storm.[15]

BA-ME reported it had insufficient generators on hand for all DLC sites affected. The limited availability of backup generators was further strained by the theft of a number

of generators deployed at field locations to maintain service. Some LECs stated at a statewide retrospective meeting on the ice storm that they had contacted the National Guard for assistance in providing security at generator sites, but were advised that the Guard was assisting electric utilities only.

RECOMMENDATION II-2. Public utilities whose services depend on the availability of utility-provided power at remote field sites should develop contingency plans addressing loss of power to those sites for an extended period of time, and incorporate those contingency plans in their emergency restoration plans.

The Staff report in this Inquiry recommended that utility and government representatives meet to identify ways in which security needs of public utilities providing essential utility services can be addressed during emergencies. In its comments on this issue, DVEM stated that "[s]ecurity needs are a public safety (law enforcement) responsibility. Should utilities require security assistance . . . police should be notified" We appreciate DVEM's clarification, and reflect its comment in the following recommendation.

RECOMMENDATION II-3. Utilities should incorporate law enforcement contact information for security needs into their Emergency Response Plans.

Responses of local exchange carriers (LECs) operating in Maine to Staff questions are tabulated in Appendix F to this Order.

2. Water Utilities

A number of water utilities in the areas without commercial power had to rely on backup power sources to continue water supply to their customers, and both supply and treatment were affected in some cases where backup power was not installed or available. A few water systems reported electronic equipment damaged by power surges. Many water utilities experienced increased operating costs due to the storm but actual damage to the water utility plant was mostly limited to power lines and electric services owned by the water utility.

Eighty-nine reporting water utilities lost power for periods lasting from 1 hour to 13 days. The outages were sporadic for some water utilities but were continuous for others.

Fifty-eight of the utilities reporting a power outage had full or partial on-site generation or alternative power that enabled them to continue operating at full or reduced capacity. The customers of these water utilities did not lose water service. Twelve of this group plan to purchase additional

backup generating capacity. The Hebron Water Company issued a "Boil Order" when its generator that operates disinfection facilities for its gravity water supply failed.

Thirty-one of the water utilities reporting an outage did not have backup power on site. Only five of those utilities reported service interruptions to customers. Four utilities advised that water service was interrupted to all of their customers. New Sharon Water District had three high-elevation customers out of service for 4.5 days. Ten of the 31 utilities advised that they plan to purchase generators as a result of the storm.

Table 1 lists the five water utilities whose customers lost service, the number of customer accounts affected, and the number of days they were without service.

TABLE 1

UTILITIES HAVING CUSTOMERS THAT LOST WATER SERVICE

UTILITY	NUMBER CUSTOMERS AFFECTED	POWER OFF (DAYS)	OUT OF SERVICE (DAYS)	NOTES
Addison Point Water District	57 (all)	4.5	1 - 2	Rented a generator after system went dry
Dresden Mills Water District	12 (all)	2.5	2.5	
Exeter Water Department	15 (all)	3	3	
New Sharon Water District	3 (of 82)	4.5	4.5	
Northport Village Corporation	~30 (of ~30)	approx. 7	approx. 7	About 30 of 240 customers are year-round

Table 2 lists the remaining 26 water utilities without backup power that maintained water service, the length of the power outage, and actions taken that allowed them to continue service.

TABLE 2

UTILITIES THAT LOST POWER AND HAD NO ONSITE BACKUP FACILITIES

UTILITY	LENGTH OF OUTAGE (Days)	NOTES/ACTION TAKEN
Alfred Water Company	0.33	Power off and on - Off for a total of 8 hours
Baileyville Utilities District	0.08	None
Biddeford & Saco Water Company	0.42	None
Clinton Water District	6	Rented a generator from Cianbro
Cornish Water District	0.5	None
Dixfield Water Department	1.58 off/on	Used Public Works' generator
Ellsworth Water Department	0.9 off/on	Rented a generator
Freeport Division - CMWC	5	Rented a generator
Gardiner Water District	1.79	National Guard & BNAS generators
Great Salt Bay Sanitary District	4	BNAS generator
Harrison Water District	5	None
Kezar Falls Division - CMWC	0.5	Rented a generator
Limerick Water District	6	Had a generator on standby but did not use it
Livermore Falls Water District	5	International Paper CO. provided a generator
Long Pond Water District	6	U.S. Navy - Winter Harbor generator
Milbridge Water District	6	National Guard generator
Norway Water District	1.5	None
Pittsfield Water Works	2	Had a generator on standby from Cianbro
Sandy Point Water Company	9	A young man came with his generator
Skowhegan Division - CMWC	0.125	None
South Berwick Water District	0.75	None
Starks Water District	4	None
Waterboro Water District	0.67	None
West Paris Water District	13	Rented a generator
Winter Harbor Water District	2.5	U.S. Navy - Winter Harbor generator
Winterport Water District	5	National Guard generator

The water utilities that were able to provide continuous service to their customers were not always able to do so at normal operating pressures. Many had backup power for source of supply and treatment facilities, but most did not have generators or connections to permit them to operate booster stations serving high-elevation areas. These high service areas, in most cases, still received water service, but had lower than normal pressures. Because booster stations tend to be located in more remote sections of the distribution systems, some remained without electrical service after power was restored to the main water supply facilities.

The Hebron Water Company's 21 residential customer accounts, a church, and the Hebron Academy facilities were instructed to boil all water to be used for cooking, dish washing, and human consumption. The company was only able to provide untreated surface water after the generator operating its disinfection facilities failed.

The customers of the other 83 water utilities that lost power did not experience any significant change in their water service, unless they were served by a booster station that lost power. Those customers still received water service, although at a reduced pressure.

The Federal Emergency Management Agency (FEMA) observed that "several communities were deprived of water supplies after the power failed, because they had no alternate electrical source. The Interagency Hazard Mitigation Team convened by FEMA recommended that "water supply and sewer systems . . . have on-site alternate power." [16]

In its comments on this issue, the Maine Rural Water Association (MRWA) expressed a concern that "[t]he purchase of back-up generators may be beyond the financial capacity of many of the smallest utilities, but well within the ability of small towns (and other utilities) in which these water systems are located. . . . Joint purchase of back-up generators may well take care of . . . requirements" We recognize that utilities need to evaluate equipment acquisition on an individual basis, and do not wish to preclude innovative or cooperative purchase arrangements such as those suggested by MRWA, where those arrangements can make it easier for utilities to acquire recommended equipment.

RECOMMENDATION II-4. All Maine water utilities should install and maintain backup power sources for source of supply and treatment facilities, and for booster stations necessary for customers to continue to receive water service during emergencies interrupting utility-provided power.

III. PREPARATION

This section of the Order addresses issues related to advance preparation by utilities and government for events such as the January ice storm. This section describes past Maine utility experiences in two significant storms (Hurricanes Gloria and Bob) and addresses utility planning for emergencies. It also describes issues related to utility pole lines and their maintenance, and Commission rules and policies that were implicated in the ice storm.

A. Lessons Learned from Previous Storms

Maine utilities have experienced other severe weather events in the recent past that interrupted utility services. Hurricanes Gloria and Bob are two such storms that caused widespread damage throughout much of the same areas affected by the January ice storm. The January storm, however, had a much greater effect than either of those previous storms.[17] Post-storm assessments conducted during those two hurricanes are still valuable, from the perspective of lessons learned and those not learned.

1. Hurricane Gloria

In September 1985, Hurricane Gloria moved through Maine, interrupting utility services to Maine customers. Some customers thereafter filed a formal complaint with the Commission. The complaint alleged that CMP was deficient in its communications with customers and in the manner in which it restored power during and after the storm. Parties to the complaint proceeding reached an agreement, subsequently amended, to resolve the case. The agreement contained several findings and recommended courses of action. The Commission found those findings and recommendations reasonable, and noted that:

many of the major problems during the restoration period were communications rather than restoration itself. We particularly wish to emphasize the importance of disseminating information concerning the timing of power restoration which is specific by area. It is especially important that this information be broadcast by radio because of the difficulty customers may have reaching the Company by telephone (even with increased telecommunications capacity recommended by the [agreement]), because few customers have battery-powered televisions and because information in newspapers is unlikely to be as timely.[18]

2. Hurricane Bob

In August 1991, Hurricane Bob passed through New England, interrupting or impairing electric, telecommunications, and water services to many Maine customers. The Staff conducted a summary investigation following the storm and identified numerous issues related to utility preparation and emergency management. The Staff recommended Commission follow-up in four areas: (a) backup power for field equipment dependent on utility-provided power, (b) a consistent system for outage recording and reporting, (c) CMP influence on Maine Yankee operations, and (d) documentation of storm experiences.[19] Thereafter, the Staff held informal meetings with Maine telephone utilities to stress the importance of backup power issues. The Commission subsequently amended Chapter 130 of the Commission's Rules to address outage reporting issues.[20]

FEMA conducted a regional assessment of Hurricane Bob's impact on New England, and made a number of recommendations related to utility facilities, services, and practices.[21] Issues encompassed by those recommendations were: utility roles in emergency response planning, public education about hazards from backup generator use, secondary and backup power for critical water and waste water facilities, emergency operation communications not dependent on commercial power, telecommunications utility planning to mitigate effects of power outages, uniform tree line clearance standards, and local tree ordinances based on those standards.

3. Lessons Learned

Communication of specific restoration information to customers was an issue identified as needing further action after Hurricane Gloria. This issue remained partially unresolved during the January 1998 ice storm, and was widely perceived by the public as a significant issue. Many utilities adopted FEMA Hurricane Bob recommendations and progress was made on three issues identified in FEMA's Hurricane Bob report: (a) backup power for field equipment dependent on commercial power; (b) a consistent system for outage recording and reporting; and (c) documentation of storm experiences. These issues, however, all remained partially unresolved during the January 1998 ice storm. For example, although many telephone utilities improved their backup capabilities, many Maine customers once again lost telephone service during the ice storm when digital loop carrier systems lost power and their backup batteries discharged.

RECOMMENDATION III-1. All public utilities that have not already done so should perform a thorough assessment of their preparation for events of the magnitude of the January 1998 ice storm, including an assessment and update of their emergency restoration

plans (ERPs) in light of what they learned from the ice storm. Those assessments should include a comprehensive review of Hurricane Gloria and Bob experiences and recommendations of all other Maine utilities.

B. Emergency Planning

When the January 1998 ice storm occurred, some utilities were in the process of drafting emergency restoration plans (ERPs), some utility ERPs were out of date or had not been tested, some utilities relied on different procedures that had not been integrated into an overall plan, and many utilities had no emergency restoration plans at all. Many utilities found that their plans and procedures were inadequate for such a major event as the ice storm. Some elements of utility planning proved marginally adequate to meet the challenges posed by the storm.

1. Electric Utilities

During restoration of service interrupted during the January ice storm, CMP followed a "draft" Emergency Storm Restoration Plan and related service center restoration plans. According to CMP's report, the three major facets of the process were: pre-storm planning, moving to 24 hour operations at service centers, and restoration of power. CMP executed pre-storm planning according to normal storm procedures. CMP normally switches to 24-hour operations at service centers when outage calls become too great for its communications center to dispatch. This step was taken by most service centers before calls exceeded capacity. This resulted in CMP managers and crews getting a head start on outages that were reported. CMP management assigned roles and responsibilities in accordance with local storm restoration manuals. CMP approached restoration of power by repairing major circuits first rather than individual customers, due to the major damage to its infrastructure. CMP used circuitry maps to assign work and to track the progress of restoration manually. CMP stated it plans to update roles and responsibilities of its ERP functional units.

BHE had an existing ERP which it found needed to be modified to address extended outage events. BHE identified numerous changes it plans to make to its emergency plan as a result of the storm.

EMEC plans to incorporate various procedures into a formal plan shortly.

2. Telephone Utilities

Bell Atlantic had emergency procedures in place at the time of the ice storm. BA-ME's Emergency Operations

Procedures (EOP) establish an incident command and control authority, intended to ensure a coordinated response and recovery effort. BA-ME established a local command center at its 1 Davis Farm Road facility in Portland on the morning of Thursday, January 8. The center, commanded by an Operations Director, was responsible for plan organization, resource requirements, crew assignments, logistics, and communication with BA-ME employees. The center also coordinated the distribution of emergency equipment and personnel and tracked the service restoration process. Four daily conference calls were held for Maine status updates, damage assessments, deployment instructions and priority planning.

When the magnitude of the storm became apparent, Bell Atlantic declared a Level III state of emergency on the morning of Friday, January 9, and established a regional command center in Boston. This command center set priorities and coordinated the assignment of resources and personnel, and was directed by the Market Area Vice President. The regional center monitored the trouble report rate of the various areas and coordinated emergency materiel procurement. Daily conference calls were held to discuss issues. Bell Atlantic's EOP was used to prioritize the utility's restoration efforts throughout the storm.

A number of independent telephone companies providing local exchange service did not have a formal ERP in place, and many of those that did found that their plans needed modifications based on what they had learned from the ice storm. Most of these companies did not have a written emergency restoration plan, although several had good ERPs in place. BA-ME's and Utilities, Inc. companies' plans were comprehensive, well thought out and could serve as models. Most companies set and communicated to field personnel criteria that prioritized restoration efforts. Some companies' reports, however, did not demonstrate that the process of setting restoration priorities was incorporated into their ERPs. ERPs should include setting storm-specific priorities as an early step in management's response to the storm.

3. Water Utilities

Fifty-eight of the 122 water utilities responding to the Staff survey reported that they have an emergency response plan. The water utilities rated their own emergency response plans as follows:

Perfect	3
Adequate	34
Practical	1
Needs to be Updated	18
<u>Inadequate</u>	<u>2</u>
Total	58

Only 10 water utilities reported having a plan for restoration of service. This is in part due to the nature of buried pipe line systems and the fact that water utilities typically have only one break at a time. Normally, when a break is repaired, service is restored to all customers affected.

4. General

We believe that a prudent utility practice would be to maintain and exercise an ERP that addresses all reasonably-expected emergency situations that a utility may face. Some utilities have raised this suggestion to improve their own future readiness.[22] ERPs should be designed to ensure continued delivery of safe and adequate service to customers during foreseeable emergency situations. We will require utility ERPs to be developed and exercised, as some other jurisdictions have done.[23] Utilities that are public utilities solely because they resell services of other utilities, and operators of customer-owned coin-operated or coinless telephones (COCOTs), should not need to develop or maintain ERPs.

In its comments on this issue, the Maine Rural Water Association stated that "during emergencies of this nature, rural (and municipal) communities . . . must be able to identify and develop suppliers locally." We expect that utilities will incorporate individual needs and solutions into their plans when developed.

RECOMMENDATION III-2. Every public utility operating in Maine should have a written emergency restoration plan (ERP). Those utilities that have not yet developed written ERPs should develop them. ERPs should include, as first steps, guidelines for setting priorities for restoring services, managing restoration efforts, and communicating with customers. ERPs should be reviewed and approved by senior utility management.

RECOMMENDATION III-3. Utilities should ensure their emergency restoration plans address specific needs for backup power supplies, consistent with established industry guidelines.[24]

The Staff recommended that water utilities maintain backup sources of water supply. In its comments on this issue, the Maine Rural Water Association (MRWA) stated that "[w]hile the recommendation is laudable, . . . we must remember

that many water systems (not just the small) have trouble enough locating, protecting, treating and affording existing supplies." While we recognize some utilities may have difficulty maintaining existing supplies, we wish to minimize the vulnerability of water utilities that maintain single sources of supply to the possible failure of those sources. We adopt Staff's position and recommend that water utilities maintain backup sources where feasible.

RECOMMENDATION III-4. All water utilities in Maine should install and maintain a backup source of water supply that could be used if an emergency disables the utility's primary source of supply.

The Staff recommended that utilities make ERPs available to the Commission and to the Maine Emergency Management Agency (MEMA) of the Department of Defense, Veterans & Emergency Management (DVEM). In its comments on this issue, DVEM stated that ERPs "would be of limited use" to that agency, and we will defer to DVEM's judgment in this area.

The Staff suggested that "highly-sensitive" information such as contact numbers and access codes could be redacted from utility ERPs provided to the Commission. CMP commented that "Confidential Business Information" included in these plans be protected as well. The Staff did not propose to limit the use of the term "highly-sensitive," and thus utilities will be free to request additional protection of ERP information on an individual basis. We discuss protection of information considered confidential by utilities further in Section IV.D.3 below.

RECOMMENDATION III-5. Public utilities should make ERPs available to the Commission for informational purposes upon request. If necessary, utilities may provide redacted versions of their ERPs to protect highly-sensitive information such as confidential contact numbers and access or authentication codes.

FEMA noted a need to test response and recovery plans. The Interagency Hazard Mitigation Team (IHMT) convened by FEMA recommended that the State "[d]evelop a simulated emergency exercise" using GIS and utility infrastructure and service information.[25] Unusual weather events during all seasons increase the likelihood of significant weather-induced outages of utility services. Recent examples are outages experienced in New England and Canada during the January 1998 ice storm, and in Texas and California when extremely hot summertime temperatures occurred during the summer of 1998.[26] Maine utilities and emergency management agencies should be prepared for these events. Some utilities may already have these provisions in place, or may be moving in that direction. In comments it filed

on this issue, Bangor Hydro-Electric Company advised that it will expand its internal procedures to "add an annual drill to test the Emergency Plan."

RECOMMENDATION III-6. ERPs should be tested through periodic drills conducted by each utility.

The Staff recommended that the Maine Emergency Management Agency of the Department of Defense, Veterans & Emergency Management (DVEM) include utilities in emergency exercises. In its comments on this issue, DVEM stated that "[t]he suggestion . . . is appropriate," and that "if the PUC amends Chapter 130 to require utilities to periodically test ERP's, the accomplishment of this recommendation would be facilitated." We adopt DVEM's suggestion.

CMP commented that it "agrees in general" with the Staff recommendation, and raised concerns about protection of confidential information. We discuss protection of information considered confidential by utilities further in Section IV.D.3 below.

RECOMMENDATION III-7. We suggest that the Department of Defense, Veterans & Emergency Management periodically incorporate public utilities (electric, telecommunications, water, and gas) into regional and statewide drills and exercises, to test and improve the readiness of utilities and emergency management agencies on all levels to respond and coordinate during emergency situations involving Maine utilities.

RECOMMENDATION III-8. The Commission will amend Chapter 130 to require utilities to maintain and periodically test emergency restoration plans (ERPs).

C. Utility Poles and Lines

1. Maintenance

Although other utilities experienced pole and line damage, CMP, BHE, and BA-ME own most of the poles and lines affected by the ice storm. This section of the Order focuses on trends in tree trimming expenditures, pole plant, and pole failures experienced by these three utilities.

a. Tree Trimming Expenditures

For the years 1993 through 1998, CMP, BHE, and BA-ME reported that they maintained fairly constant levels of spending in their transmission and distribution line clearance (tree trimming) programs. Although the magnitude of the damage

to trees caused by the January 1998 ice storm raised public perceptions that utility tree trimming was inadequate,[27] we did not find evidence that decreased spending in these areas caused a higher number of outages during the ice storm than would otherwise have occurred. CMP's spending actually increased at a compound annual growth rate of about 13% during the period. Spending on trimming along distribution circuits by BHE was nearly constant. In the same time frame, BA-ME increased annual spending on maintenance trimming, while it reduced line clearance spending for new construction projects.

b. Condition of Pole Plant

CMP, BHE, and BA-ME all perform visual inspections of their distribution pole plant and have a "replace as needed" policy. Because none of these utilities maintain a database on the condition of their distribution plant, it is difficult to determine whether the number of poles needing replacing has increased over recent years. The Staff reviewed summary pages of CMP's transmission pole plant inventory which showed annual rotating inspections of transmission circuits for each year during the study period. BHE reported it maintains an inventory database for its transmission plant. BA-ME makes no distinction between transmission and distribution poles (shared poles are probably shared distribution poles). BA-ME maintains an inventory of the half million poles it owns or shares, but the physical condition of the pole is not included as a data element in that inventory. Given the number of poles each company needs to track, we believe the "replace as needed" standard is an appropriate maintenance practice.

c. Pole Failures

Utilities reported pole failure rates ranging from 0.07% (BA-ME jointly-owned with other utilities) to 0.8% (BHE wholly-owned, untreated native cedar poles). The Staff did not draw any conclusions based on this information in its report.

Regarding the age and condition of poles that failed, CMP was unable to respond. CMP's stated priority was to restore service, and broken poles were often removed by cities and towns, or occasionally individuals, without utility inspection.[28] BHE stated that most of the poles that failed in its service territory were untreated native cedar, and stated that pole failures were due to ice loading caused by trees and limbs falling onto the lines. BA-ME asserted that the cause of damage to poles was wholly attributable to ice loading and not related to the age or treatment of poles.

During recovery operations, the media reported that poor maintenance and substandard condition of poles

caused pole failures. We have not found any information that corroborates those allegations.[29]

Based on the information provided by the utilities, we can find no evidence of deferred spending on line clearance and maintenance, or systematic reductions in inventory levels that may have increased the number or prolonged the duration of ice storm outages. Accordingly, we do not believe the information forms a basis for further formal investigation. Some additional focus on this area by utilities, however, is necessary.

The Staff recommended that random examination of failed poles by utilities would provide useful information. In its comments on this issue, CMP stated its "current procedures satisfy this recommendation," and that it "maintains its pole plant in accordance with good engineering design and standard industry practice." CMP suggested that "[b]ased on this experience, the Company believes a random assessment of pole failure would add little value." We believe that random assessments will give utilities a better understanding of failure mechanisms and enable improved maintenance practices to lower future failure rates, and thus adopt Staff's recommendation.

RECOMMENDATION III-9. Because of the difficulty in assessing pole failure causes during outage situations, utilities owning poles and lines should develop programs to routinely assess root causes of pole failures, selecting and examining failed poles at random during normal operations. Where possible, randomly-selected pole failures resulting from major storms should also be assessed under the same programs to determine whether failure mechanisms may be different during those events.

d. Line Clearance Approach

We cannot be certain that utilities with aerial infrastructure (poles, lines, and transformers) are employing the most effective techniques for line clearance and maintenance. Rather than continue traditional line clearance programs based on space and time criteria (e.g., removal of all limbs within 8 feet of lines every 5 years), some New England utilities have developed "hazardous tree" programs. Such programs focus on identification and removal of specific hazardous trees and limbs that have become weakened by old age, disease or insects, and that are located where likely failure during severe weather will adversely affect utility lines. Some utilities have observed that a small percentage (perhaps only 10%) of tree populations drive reliability indices and storm costs, and they claim that programs to remove potentially hazardous trees are cost effective.[30]

Maine statutes, under normal circumstances, strike a balance between the rights of individual homeowners and the utilities' responsibility to ensure safe, adequate and reasonable service, as described in Section III.D below. That balance is upset, however, in major storm situations. The current practice of removing tree limbs up to a distance of 8 feet from the conductor has not proven sufficient to minimize outages due to severe storms (i.e., ice, high wind, hurricane, heavy wet snow). There are many large older trees, often more than 8 feet from the nearest conductor, that pose a hazard to distribution feeders. When large trees fall, their weight often breaks poles and brings wires to the ground, requiring considerable effort and time to repair. Trimming small branches may protect against excessive recloser operations or blowing fuses, but does nothing to reduce major tree damage to lines.

The Interagency Hazard Mitigation Team (IHMT) convened in Maine by FEMA observed that "[p]roblem trees and clearance alternatives that could have reduced interruptions to utility services were not previously identified" before the January ice storm. The IHMT recommended that the PUC, working with the Maine Municipal Association, local governments, and utilities, "[d]evelop a statewide performance based tree management program that minimizes the risk of power loss to customers and reduces operating costs of the power companies." The IHMT further recommended the PUC "[e]xamine the feasibility of an Integrated Vegetative Management plan" and [e]valuate utility tree line clearance activities to identify and promote the most effective techniques," using GIS tools.[31] Similar recommendations were made by IHMTs in other New England states.[32] Efforts to improve line clearance practices should include input from resources familiar with Maine's existing line clearance activities, such as line clearance crews and municipal arborists.

BHE and CMP filed comments on this issue. BHE stated it "would support and participate in the development of a Hazard Tree Program." BHE recommended an additional area of inquiry: "that the Commission work with the utilities, the Maine Municipal Association, and the Maine Department of Transportation in a review of current standards for utility pole permitting."

CMP, on the other hand, commented that it "does not believe a formal inquiry is appropriate at this time." CMP advised that it "has incorporated hazard-tree removals into its vegetation-management program" and "believes increasing utility trimming zones and removal rates would be beneficial only if State laws were revised."

We believe that the sharing of experiences between utilities on hazard tree approaches will be beneficial, and adopt Staff's recommendation. We are aware of the need to

examine whether existing law would support these approaches, however; we discuss statutory issues in Section III.D below.

RECOMMENDATION III-10. We will conduct an inquiry to evaluate whether a targeted line clearance approach (e.g., the Hazard Tree program adopted by Eastern Utility Associates) may be similarly cost effective for Maine's utilities, and to identify ways of improving tree line clearance consistent with IHMT recommendations. As part of this inquiry, we will retain a consultant to organize a series of workshops with electric and telecommunications utilities, and federal, state, and local government agencies with an interest in these areas.

2. Design

a. Weather Loadings

Maine law requires all electric utilities, telephone utilities, and cable television companies to "design, construct, operate and maintain [their] lines and equipment in conformance with the applicable provisions of the most recent edition" of the National Electrical Safety Code (NESC).[33] The NESC designates three general degrees of combined ice and wind loading due to weather conditions, and places Maine in the "heavy" loading category.[34] The NESC specifies that a radial ice thickness of 0.50 in. be used in calculating loads in the heavy category, and 0.25 in. in the medium category.[35]

The ice accumulations experienced during the January 1998 ice storm greatly exceeded the thickness specified in the NESC for the area. Experience during the January 1998 ice storm suggests that the 0.50-inch criterion may be low. A criterion high enough for aerial infrastructure to have withstood ice storm accumulations of about 4 inches would likely be extremely costly, however. A modest increase in the criterion (e.g., to 0.75 in. or even 1.00 in.) may be reasonable, however, at least for transmission facilities.

These criteria are contained in the "Overhead Lines -- Strength and Loading" section of the NESC. The National Association of Regulatory Utility Commissioners (NARUC) has a representative on most of the NESC subcommittees responsible for different NESC sections, but state utility commissions do not have representation on the subcommittee responsible for strength and loading issues. Consistent with recommendations elsewhere in New England,[36] the adequacy of these criteria should be reexamined in light of ice storm failures experienced. The US Army Corps of Engineers Cold Regions Research and Engineering Laboratory should be consulted in this process.

BHE and CMP filed comments on this issue. BHE concurred with the Staff's recommendation, and filed an analysis prepared for the Public Advocate that concluded that "[t]he incremental cost associated with a reasonably higher extreme ice condition is not overly significant to most transmission line designs." CMP stated it "already incorporates an extra ice load" in most of its transmission designs, and concluded "there would be little impact" from the recommendation. We believe a "very heavy" ice loading category may be justified, a belief strengthened by CMP's adopting a heavier ice load design criterion on its own initiative. We adopt the Staff's recommendation.

RECOMMENDATION III-11. *We will request NARUC to ask NESC Accredited Standards Committee C2, Subcommittee 5 (Overhead Lines -- Strength and Loading) to consider whether creating a "very heavy" ice loading category with a higher ice accumulation criterion for the Northeast US would be appropriate in light of ice storm experience. We will ask NARUC to consider appointing a representative to that subcommittee to participate in that evaluation.*

b. Placement of Facilities Underground

During ice storm recovery activities, some members of the public suggested that Maine's electric infrastructure would be less subject to failure if it were placed underground rather than on aerial facilities. CMP advised that it studied the feasibility of underground distribution lines in 1988, and estimated that such a system would cost about 10 times the cost of the aerial system in use. CMP estimated that changing to an underground distribution system would cost at least \$8.5 billion in 1988, plus costs of removal, regulators and transformers, and labor, resulting in a monthly increase of \$95 to each CMP customer bill.[37] BHE estimated that underground facilities cost between 50% and 100% more for new home construction, driven by both higher costs for underground cable and its installation.[38]

Placement of electrical systems underground was also studied by Ontario Hydro in the aftermath of the ice storm. Ontario Hydro estimated that placing cables underground in 1998 would cost about C\$11 billion for an area with about one-third the number of customers as Maine, with much higher costs expected where rocky terrain is encountered.[39]

A special committee appointed by Hydro Quèbec's Board of Directors concluded that "undergrounding high voltage transmission lines . . . remains highly uneconomical" and that "for long lines, the technical feasibility of undergrounding remains to be confirmed." That committee observed, however, that

in distribution systems, placement of distribution facilities underground can be economic in some circumstances. The committee reported that a German electricity and gas supply company, VEW Energie, has reduced life-cycle costs of its distribution network through "years of experience with undergrounding, network configurations, different voltages, direct-buried cables, standardization, quality control of equipment and installation, costs of cables and coordination of joint use of trenches." The committee noted that the "European distribution network architecture . . . is significantly different from that of North America," but nevertheless suggested that "undergrounding of electrical distribution should be fostered . . . where customers and municipalities are willing to share the extra cost." [40] The IHMT convened by FEMA in Vermont recommended that the State of Vermont develop an incentive program with utilities subsidies for homeowners who agree to pay the expense of burying service drops. [41]

The placement of transmission facilities underground does not necessarily improve the reliability of those facilities, however. CMP and Ontario Hydro have both identified a number of benefits of underground facility placement, particularly in urban areas, including safety, reduced weather-caused outage frequencies, and lower tree trimming costs. The two utilities' studies also identified corresponding disadvantages, however, including much longer outage durations, with location and repair times ranging from 8 to 48 hours longer for underground faults. [42] Recent catastrophic failures of underground transmission facilities serving Auckland, New Zealand also underscore these disadvantages. [43]

In summary, placement of electric infrastructure underground may have benefits in lower outage frequency, less susceptibility to weather events, and aesthetics. That practice would likely also raise problems from higher outage durations, higher susceptibility to flooding and excavation events, winter access and repair times. While continued placement of underground facilities in urban areas or new developments may be desirable under some circumstances, we do not believe that the advantages that could be achieved from relocating aerial facilities underground would offset likely disadvantages and costs.

RECOMMENDATION III-12. Utilities owning poles, lines, and transformers in Maine should monitor undergrounding projects in other areas to determine whether new technologies or materials may affect the economics of undergrounding new or existing facilities in Maine in the future.

D. Statutes Related to Utility Line Maintenance

The statutory provisions applicable to electric and telephone utilities' tree trimming and removal were enacted in 1993 and are contained in 35-A M.R.S.A. § 2522 (included as Appendix B to this Order). This section allows utilities to trim, cut, or remove trees located in the public right of way or encroaching on the public right of way when necessary to ensure safe and reliable service, if the utility follows certain specified procedures. In general, the utility must notify either the Department of Transportation or the municipality with jurisdiction over the road and publish newspaper notice 30 days in advance of cutting. It also must maintain a list of customers who request to be consulted prior to cutting. Before removing any shade or ornamental tree, the utility must consult with the landowner. None of these provisions apply in an emergency situation.

Section 2522 applies "notwithstanding any provision of law." Therefore, several other statutory provisions must be read in conjunction with section 2522. This includes 35-A M.R.S.A. § 2514 which prohibits injury, cutting, or destroying fruit, shade or ornamental trees and shrubs when constructing or maintaining poles and lines along roads. 17 M.R.S.A. § 2510 makes it a civil violation to cut down a tree without the owner's consent except that public utilities maintaining adequate facilities in emergencies are exempt from this section. 30-A M.R.S.A. § 3283 provides that public shade trees (e.g., all trees within or upon the limits of any highway) may only be removed with permission of the owner and consent of tree warden or conservation committee except that cutting to alter highways or suppress insects is permitted without such permission. The municipal/state notification and use notification list requirements in 35-A M.R.S.A. § 2522 likely supersede any requirements for individual notification in these statutes.

In summary, the current statutes require at a minimum, notification in newspapers and to the municipality about planned maintenance tree trimming and, in cases where requested, notice to the individual owners. In emergency situations, utilities may cut any tree that presents a threat or danger.

A practice adopted by some utilities in New England that focuses on removing "hazard trees" has proven successful in reducing the number and duration of outages. As described above, the laws in Maine are not conducive to the removal of "hazard trees" when a property owner objects. BHE stated a need for greater tree clearance discretion by utilities in the future, and Saco River stressed the need for periodic maintenance-tree trimming both in public rights of way and private property. FEMA has recommended that the PUC take action to revisit tree trimming issues for statewide effect.

In its comments on this issue, BHE suggested that "improvements in legislation governing tree trimming and removal are needed. Bangor Hydro understands that a broad coalition of interests is needed to develop this legislation." We expect that such a "broad coalition" may be formed as part of the inquiry we will conduct into line clearance issues, discussed in Section III.C.1.d above, and that any recommendations for additional legislation that may support improved utility line clearance practices may be identified by that group.

RECOMMENDATION III-13. As part of its line clearance inquiry, the Commission will evaluate whether current legislation supports targeted line clearance approaches and what improvements, if any, could support improved utility practices.

E. Commission Rules and Policies

In their preparation for service-affecting situations such as the ice storm, and in their response to and recovery from those situations, Maine utilities are guided by rules and policies previously adopted by the Commission. This section of the Order focuses on those rules and policies.

1. Chapter 130 - Safety and Accident Reporting Requirements

This Commission rule currently requires utilities to notify the Commission Staff immediately of any "disruption of utility service to more than 500 customers or 1% of a utility's customers, whichever is greater, or to critical facilities identified by other public utilities for a period of longer than 30 minutes . . . where such information has not already been reported pursuant to another Commission rule." [44]

Another Commission rule, Chapter 20, establishes a different reporting threshold for telephone utilities. Chapter 20 requires local exchange carriers to notify the Director of the Commission's Technical Analysis Division "as soon as possible, but no later than within twenty-four hours after any major service interruption." The rule define a "major service interruption" as "any failure of or interruption in service to at least 500 subscribers, or at least 10% of the carriers' subscribers, whichever is fewer, of five minutes duration or longer . . ." [emphasis added].

a. Notification and Reporting

Many utilities admitted that they did not observe Chapter 130's notification requirements during the January ice storm. Bell Atlantic, for example, reported that it did not follow its own "procedures and documentation which occurs with Major Service Outages" during the storm, including

requirements of Chapters 20 and 130 of the Commission's rules. BA-ME stated it did not collect any service outage data for almost four weeks during and after the storm (from January 8 through February 2).[45] BA-ME's storm performance team, convened after the recovery, recognized in its internal recommendations the need for that utility to adopt a standardized form to capture storm damage information.

Most local exchange telephone companies had nothing to report relative to Chapters 20 and 130. Outages reportable under Chapter 20 usually result from switch or trunking failures. Because most service outages were due to downed drop lines, most companies did not have outages reportable under Chapter 20, and were not clear what Chapter 130 information they were required to provide.

Some utilities suggested changes to Chapter 130. EMEC suggested that the Commission initiate a new inquiry to help advise how to address outage reporting during major storms. Some water utilities suggested organizational changes to the rule and clarification of roles between the Commission and the Division of Health Engineering in the Department of Human Services.

b. Critical Facilities

When we last amended Chapter 130, we recognized a need for all utilities to notify each other, in advance of an emergency, of the locations and emergency service needs of critical utility facilities, and directed utilities to identify to each other their critical facilities:

[E]ach public utility should identify its facilities or services that are critical for the public safety and dependent on utility services provided by others. Each utility should then notify those utilities providing critical services and coordinate appropriate responses to service interruptions.[46]

Standish Telephone and some water utilities observed that the definition of "critical facility" was not clear. Only BA-ME described a critical facility outage (loss of telephone service to a CMP garage when a BA-ME digital loop carrier system lost power). The issue of critical facilities -- meaning, in this application, telephone service connections to other public utilities' critical facilities -- does not seem to be familiar to or well-understood by the utilities. Utility storm reports suggest that critical facilities requirements may not have followed.

Utilities should generally recognize the facilities of other utilities as "critical." Some utility restoration priorities did not place other utilities in priority restoration status. For example, CMP stated that its sole restoration priority on Saturday, January 10, was "to keep the hospitals on,"[47] and did not consider essential needs of other utilities. Restoration of water and wastewater service to a hospital may be a higher priority than restoration of its electrical service if the hospital has backup power for its emergency facilities.

FEMA recommended modification of Chapter 130, if necessary, to address critical facilities and restoration priorities issues. The FEMA-convened Interagency Hazard Mitigation Team stated that "[c]ritical care facilities (Hospitals, Nursing Homes, Emergency Services, etc.) must have [realistic power restoration projections] immediately."[48]

After the storm, the Northeast Power Coordinating Council (NPCC) recognized the importance of utilities knowing about each other's critical facilities during storm recovery activities. NPCC established a joint working group to identify critical facilities for restoration purposes, document critical equipment, establish standard test procedures for critical restoration facilities, and develop monitoring and reporting processes "to ensure the functionality of restoration plans."[49] The NPCC working group activity is still in process.

RECOMMENDATION III-14. We will amend Chapter 130, Safety and Accident Reporting Requirements, to create a notification process that would be more appropriate in extreme emergencies than the current rule requires, and to clarify "critical facilities" provisions.

2. Chapter 20 - Reporting Requirements for Local Exchange Carriers

As described above, some local exchange carriers were unclear about their reporting requirements contained in Chapter 20 and Chapter 130. When it last amended Chapter 130, the Commission noted that "Chapter 20 has a lower threshold that would require a report (5 minutes, compared with Chapter 130's threshold of 30 minutes)," and eliminated possible duplication of reporting requirements by requiring reporting under Chapter 130 "only where the required information has not already been reported pursuant to another Commission rule."[50]

RECOMMENDATION III-15. We will amend Chapter 20, Reporting Requirements for Local Exchange Carriers, to supplement Chapter 20's reporting requirements to reflect the revised process for major storm reporting incorporated into Chapter 130.

3. Chapter 32 - Electric Utilities Service Standards

Chapter 32 currently requires electric utilities to report service outages:

Each utility shall notify the Commission within a reasonable time in writing of interruptions of service to their system as a whole, or any major portion thereof, having a duration of two (2) hours or more. Such notice shall include date, time, duration, and cause of the interruption.[51]

In light of the restructuring of the electric industry, the accuracy and standardization of information flow on system reliability is becoming more important. The provisions of Chapter 32 do not employ recently-developed standard terms and definitions, and incorporate undefined or unmeasurable standards (e.g., "interruptions," "reasonable time," and "major portion"). As a result, reports provided pursuant to this requirement differ significantly between utilities. The Staff has begun drafting rule provisions to incorporate recommendations of a new national standard being promulgated by the Institute of Electrical and Electronics Engineers, "Trial Use Guide for Power Distribution Reliability Indices"[52], to address this issue.

RECOMMENDATION III-16. We will amend Chapter 32, Electric Utilities Service Standards, to adopt standard measures of system reliability and incorporate uniform reporting provisions for all electric utilities.

4. Treatment of Major Storms under Alternative Forms of Regulation

Current alternative forms of regulation adopted by the Commission for certain utilities do not treat major storm damage in a uniform manner, which may result in different preparation and mitigation incentives for similarly-situated utilities. Utilities should have the ability to request recovery of costs related to major storm damage upon a showing by the utility that specific identified criteria have been met. For some utilities, major storms do not trigger exclusions from service quality indices.[53]

To provide equivalent going-forward incentives and measures for all similarly-situated utilities, we will revisit existing indices that contain a major storm exemption or exogenous major storm effect provision to ensure consistency. Prudent public utility management and planning can ameliorate

consequences of major events beyond utilities' direct control, and service quality measurement baselines can be selected to reflect unusual events (e.g., hurricanes). Thus, only major events that cause very substantial drops in quality, and that the utility can demonstrate were beyond its ability to anticipate, should qualify for consideration as exogenous events exempted from service quality indices.

In comments filed on this issue, CMP expressed general agreement with the Staff's recommendation on these issues, and stated that "[c]reating a general utility-service standard for the population of Maine is a good goal." CMP stated that if differences between electric and telephone services are considered, such standardization "is an achievable goal that could serve Maine customers well." We agree with CMP that differences between different utility industries need to be considered. We will address those differences in future proceedings that adopt or modify alternative forms of regulation for individual utilities.

RECOMMENDATION III-17. The Commission will standardize exemptions of major storms from utility service quality indices (SQIs) for all types of utilities. We will employ the process[54] incorporated into the AFOR adopted in Docket No. 94-123 for Bell Atlantic - Maine as a model for this standardization.

IV. RESPONSE

Utility response to the storm involved mobilizing to meet the significant challenges posed by the storm, assessing damage sustained, forecasting restoration of service, and managing logistics related to the restoration effort. A major issue for utilities, their customers, government, the public generally, and the media is the communication of information about what had occurred, what was necessary to restore service, and what customers could expect about service restoration. These issues are discussed in this section of the Order.

A. Mobilization

The initial mobilization of resources by utilities is a significant determinant of service restoration: "the sooner you get started, the sooner you can get done." Maine utilities initiated ice storm mobilization on noticeably different levels after Sunday, January 4, 1998, when the National Weather Service (NWS) in Gray, Maine began issuing advisories for freezing precipitation.

BHE began to inventory storm-related resources on Monday, January 5, when an icing alert was issued in Canada; BHE prepared its line trucks on Tuesday, and contacted outside contractors on Wednesday. CMP alerted outage crews on Tuesday, and activated its restoration plan on Wednesday afternoon. Bell Atlantic opened its local command center in Portland on Thursday, and declared an emergency on Friday. EMEC began requesting assistance on Friday, but did not request significant assistance until Sunday, well into the storm. Retrospectively, a number of utilities identified a need to improve their ability to anticipate a possible major storm.

Early mobilization enabled some affected utilities to prepare in advance of the storm by testing emergency generators, activating emergency staffing plans, and making sure their inventories were replenished. Restoration efforts of utilities that mobilized early reflected improved coordination over other utilities that reacted to the events as circumstances made necessary without the benefit of significant advance preparation.

The Staff suggested that the Maine Emergency Management Agency of the Department of Defense, Veterans & Emergency Management (DVEM) meet with utilities and the National Weather Service to improve the communication of severe weather information to utilities, including the use of "broadcast faxes" for alerts. In comments filed on this issue, BHE stated it currently subscribes to a weather forecasting service providing the needed information. DVEM commented that "[b]oth the National Weather Service and DVEM utilize 'broadcast fax'" and that "[u]tilities should ensure they are recipients of National Weather Service alerts." Because it appears that utilities already have access to the types of information suggested by Staff, we will not adopt Staff's detailed suggestions in this area, but rather recommend that utilities ensure they are taking full advantage of services available.

RECOMMENDATION IV-1. Utilities should arrange to receive severe weather forecast alerts from the National Weather Service or other competent sources.

B. Restoration of Power

Maine's electric and telecommunications utilities, assisted by State agencies and numerous utility and utility service providers, launched a major recovery effort throughout the damaged areas. Utilities, for the most part, restored service to affected customers as soon as reasonable under the circumstances involving the most severe damage those utilities had ever experienced. Performance of restoration crews has been widely commended. Safety of the public and utility crews was maintained throughout the restoration effort. We have not found any evidence of restoration activities that would form a basis

for a further formal investigation. We have noted a number of issues, however, for which less formal follow-up is warranted.

The following graphs illustrate how restoration progressed for each of the three major electric utilities affected by the storm.

1. Central Maine Power Company

By January 9th, 275,000 of CMP's customer accounts, 52 percent, were without power. Service was restored to all but 500 customer accounts when a second phase of the ice storm struck on January 24th and caused an additional 74,000 customer accounts to lose power. As a result, it took 23 days to restore power to all regular customers. Power to all seasonal customers was restored 40 days later on April 10th, with the exception of Frye Island in Sebago Lake.

The restoration effort became the largest deployment of repair crews ever experienced in Maine, as CMP called for assistance from 71 other utilities, construction and tree companies. Over 1,000 work crews responded from as far away as Nova Scotia, Ohio, and North Carolina. North Carolina crews arrived at Brunswick Naval Air Station with bucket trucks via military airlift. At the peak, more than 3,000 crew and support personnel were employed on service restoration in CMP's service area. Directing the efforts and providing accommodations for such a large work force was a challenging task. CMP provided meals and bag lunches for many of the crews at CMP headquarters in Augusta. The utility furnished extra clothing, laundry, and other amenities in a successful effort to keep the crews focused on line repair for 16 hours per day. To minimize the probability that crews from other utilities would have trouble finding specific locations, CMP directed crews to return to the same locations that they left the previous day.

CMP halted meter reading and the meter readers' vehicles were used by "assessors" ("bird dogs") to locate and direct crews to damaged lines. CMP issued customer bills based on estimates, until meter reading resumed during the last few days of January.

2. Bangor Hydro-Electric Company

To assist in restoring service, BHE was able to secure 45 additional line crews and 36 tree crews. The outside crews were used in Bangor and Washington and Hancock Counties, while BHE's own line crews worked in BHE's service territory north of Old Town. The Maine National Guard helped remove broken poles and wires from nine miles of remote Line 66 right-of-way to make way for new construction. BHE replaced 429 poles, including 142 poles on Line 66. Many of the poles that failed were native

white cedar, commonly used by the former Union River Electric Cooperative and the former Hampden Power and Light Company.

BHE used meter technicians to fix service entrances ripped from houses. Customers are usually expected to secure the services of electricians for this work, but due to the large number of services affected, BHE meter technicians reattached many service entrances to assist customers. This resulted in a saving of hundreds of line crew hours and a much more rapid restoration of service overall.

3. Eastern Maine Electric Cooperative

EMEC's own line crews were supplemented with nine crews, including a skidder-mounted bucket truck. The crews used Calais as the hub for the restoration effort. EMEC office staff and retirees delivered meals to the crews at the work sites. Each visiting crew was accompanied by an EMEC employee to guide them to the work site to avoid the crews getting lost in remote, unfamiliar territory. Pole setting was accomplished by contract crews and Bell Atlantic. Working 16-hour shifts, the crews completed the restoration effort on January 16th, nine days after the start of the storm.

C. Logistics

Some elements of utility logistics (e.g., backup generators and replacement parts) came under stress during the ice storm recovery. Some utilities reported that their resources were severely stretched, but for the most part they reported that logistics problems were not service-affecting. Some utilities expressed concerns that a major storm with a more regional impact could cause supply problems in some areas. Bell Atlantic reported that regional resources helped supply the demand for generators that exceeded local supplies.

Backup power generation for utility recovery operations was a significant issue during the recovery. As an example, a BHE support facility suffered a power outage when its backup generation proved inadequate.

As telephone utilities have converted much of their networks to digital systems, they have increased deployment of field-located equipment dependent on commercial power to maintain batteries that operate the equipment. In the absence of commercial power throughout much of its service territory, Bell Atlantic after the storm identified a need to have standardized battery charging stations located throughout the state, and expanded generator availability.

Some water utilities needed to depend on backup generation to maintain water supply to affected communities, and

obtained generators from the National Guard, US Navy, contractors, other water utilities, industrial customers, rental companies, municipalities, individuals, and employees. Seventy-eight of the reporting water utilities have backup power for some or all of their facilities. Twenty of those did not lose their electrical service.

Most of the utilities operate the backup equipment periodically, but some do not. A tabulation of their reported operation frequency follows:

17	operate backup facilities under load weekly
36	operate backup facilities under load monthly
4	operate backup facilities under load bi-monthly
3	operate backup facilities under load quarterly
5	operate backup facilities under load semi-annually
2	operate backup facilities under load annually
2	operate backup facilities under load randomly
4	do not periodically operate backup equipment
5	did not report

Based upon the reports filed, fuels used by water utility facilities for backup power are as follows:

Gasoline	12
Diesel	29
Propane	41

Fuel availability for backup generators became a concern in areas with widespread outages (e.g., Washington County), and EMEC is considering purchasing a mobile generator for fuel pumping purposes. The extended outage caused many water utilities to exceed their fuel storage capabilities and required that they secure additional fuel from their suppliers. Several water utilities experienced problems with their generators because they were using propane fast enough to cause frost to form on the propane tanks. These problems were solved by adding additional tanks and/or running hot water over the tanks.

During an ice storm After Action Review, BHE noted that it had run short of some equipment needed to access restoration areas (e.g., chain saws). BHE also noted that information about the availability of large backup generators was not complete within the state.[55]

The Staff suggested that the Department of Defense, Veterans & Emergency Management (DVEM) research the availability of large (e.g., greater than 1 MW) backup generators in the region. DVEM filed comments on this issue, stating that "[i]nformation on the availability of large generators . . . is readily available." DVEM advised that "During the Ice Storm, the only priorities we serviced were: (1) shelters (2) public safety

facilities (3) water districts" [emphasis in original]. The Staff's suggestion addressed power company concerns about the lack of information about generator availability, an issue that appears to be resolved based on DVEM's comments. The actual availability of backup generation capacity itself to utilities is a different matter that utilities should pursue directly with DVEM as needed. Accordingly, further action on the Staff's suggestion is not required.

RECOMMENDATION IV-2. Staff recommendation not adopted as described above.

Some utilities used innovative techniques during restoration efforts. CMP reported that lighting crews deployed to support night work by tree crews greatly improved restoration efficiency. Utilities that arranged for meals to be delivered to line crews in the field (e.g., EMEC) reported that significant time was saved from that practice compared to relieving crews to eat at local restaurants. EMEC reported that a skidder-mounted bucket proved "extremely useful" for restoration in remote locations.

D. Communications with Government

1. General

The government needs accurate and timely information about infrastructure damage and restoration plans to manage resources during emergencies. When facilities or services essential to the public health and safety are destroyed or impaired, emergency managers must have very good information about the nature and extent of the damage and its effect on critical and essential facilities, and planned restoration of those facilities and services. During recovery from the January 1998 ice storm, some of the needed information was not available to government on a timely basis.

Communications between utilities and government agencies involved in storm recovery activities were on occasion ineffective during ice storm mobilization and recovery. Some emergency managers advised that CMP had provided specific restoration plans to county emergency management agencies so that the county officials could relay timely and accurate details to town managers on a regular basis.[56] Some local officials, however, expressed concerns that electric utilities did not provide sufficient information to emergency management officials, and that the lack of information complicated local shelter and emergency service planning.[57]

CMP reported that "Service Centers communicated with local emergency agencies and municipalities to address and resolve hazards" and that CMP provided a "direct line (red

phones) for municipalities was located in each Service Center." [58] These arrangements did not fully provide the information needed by some local officials, who reportedly developed their own direct methods of communicating with electric utilities (e.g., through personal visits to utility offices), enabling them to coordinate with line crews during the restoration effort. [59]

FEMA noted that "emergency responders, county and municipal officials and utility crews did not always have immediate access to current reliable incident information." The IHMT convened by FEMA recommended that utilities notify the State promptly about "infrastructure damage, areas affected by that damage and anticipated time needed to repair the damage and restore operations." The IHMT also suggested that utilities establish "crisis thresholds" to initiate communications liaisons with the State and between utility district offices and county emergency management agencies. [60]

Stressed communications between utilities and others involved with emergency management and restoration were issues elsewhere in New England [61] and outside New England as well. NPCC observed that "rapid and coordinated dissemination of timely information to the media and regulatory bodies" was a "very important" lesson learned from the ice storm. [62] Ontario Hydro described "provision of timely information to customers, governments and various stakeholders on the progress of power restoration as one of its "major difficulties." The New York Department of Public Service commended communications between telephone utilities and government support agencies that were instrumental in coordinating use of State-owned microwave equipment to restore severely damaged network facilities. [63]

When establishing protocols and procedures, State and county emergency management officials should be aware that Maine citizens receive utility service from many different utilities, depending on where they live or work. Maine customers receive electric service from one of 13 different retail electric transmission and distribution utilities, and telephone service from one of 24 different telephone incumbent local exchange carriers or perhaps one of a small number of relatively new competitive LEC entrants. Communications, notification, and liaison protocols and procedures should ensure that no utilities providing essential services to Maine citizens are excluded.

BHE filed comments on this issue, stating that it "incorporates communication with emergency agencies" in its ERP. The Department of Defense, Veterans & Emergency Management commented that "all County Directors have been encouraged to establish liaison with utilities."

RECOMMENDATION IV-3. All utilities should establish continuing emergency liaison procedures with state, county, and municipal

emergency management officials so that those officials are aware of each utility's capabilities and needs during emergency situations.

The Staff suggested that the Maine Emergency Management Agency of the Department of Defense, Veterans & Emergency Management (DVEM) consider establishing specific notification requirements for utilities, incorporating a specified threshold for such notices. Supportive comments were filed by BHE, CMP, and DVEM.

RECOMMENDATION IV-4. We suggest that the Department of Defense, Veterans & Emergency Management (DVEM) establish specific requirements for public utilities to notify DVEM when their ability to provide critical utility services has been interrupted for a period of time. Staff will work with DVEM to develop a MEMA notification threshold for interruptions using criteria already established by the PUC for notification purposes (e.g., interruption in service to at least X% of the utility's customer accounts or to critical facilities of other public utilities, of Y minutes or longer duration), to simplify the notification process for utilities.

The Staff suggested that key electric utilities notify DVEM when bulk electric transmission systems in the region are affected by generation, transmission, or load factors that may affect the continued provision of electric service to customers. CMP commented that it "agrees with this recommendation," and DVEM advised that "CMP already provides this Department with notification of OP4 and OP7 implementation." We are encouraged that CMP regularly provides information on the status of the Independent System Operator for New England (ISO-NE) to DVEM. We want to ensure that DVEM is also aware of similar circumstances in the New Brunswick control area, and thus adopt Staff's recommendation that incorporates all control areas responsible for managing the delivery of energy to Maine customers.

RECOMMENDATION IV-5. CMP, on behalf of all electric transmission and distribution utilities in the State, should notify the Department of Defense, Veterans & Emergency Management (DVEM) and the PUC when CMP is notified by the Independent System Operator for New England (ISO-NE) that ISO-NE has implemented NEPEX Operating Procedure No. 4 Action 14 or 15 or NEPEX Operating Procedure No. 7. MPS and EMEC should notify DVEM and the PUC when similar events occur in the New Brunswick control area.

The Staff suggested that it meet with the Maine Emergency Management Agency of the Department of Defense, Veterans & Emergency Management (DVEM), Department of Human

Services (DHS), and water utility representatives to maximize the effectiveness of coordination between different organizations with potentially overlapping responsibilities. In its comments on this issue, DVEM stated it would be willing to participate in such meetings. The Maine Rural Water Association commented that "[w]e think the recommendation for intra-utility meetings has great merit." We adopt Staff's suggestion.

RECOMMENDATION IV-6. The Staff should meet with DVEM, DHS, and representatives of water utility associations to determine how to coordinate emergency response related to water utilities, and how to coordinate their responses to eliminate duplication and inefficiencies.

2. Data Collection and Reporting

The IHMT convened by FEMA recommended that the State emergency operations center (EOC) be provided with detailed outage and restoration information so that it can "be the central disseminator of information to state and local governments, private businesses and individuals." [64] MEMA has designated the Commission as a member agency of the State Disaster Response Team for power failures and natural disasters.

Some utilities have expressed specific concerns about notification, data collection, and reporting procedures to the Commission. Some utilities suggest that current notification and reporting procedures were administratively difficult during major storms.

To improve the Commission's ability to support state emergency managers and utilities themselves during major emergencies, these processes should be as effective as possible without creating unnecessary utility burden. Commission procedures should permit utilities to provide the required information directly from their internal notification and reporting systems (e.g., e-mail or file transfer) used for utility operational purposes, rather than require that the reported information be administratively reprocessed by utility regulatory or legal personnel.

The Staff suggested that the Commission improve internal capabilities to receive messages from utilities electronically, and incorporate related provisions into Commission Rules. CMP filed supporting comments on the Staff's recommendation, which we adopt.

RECOMMENDATION IV-7. The Commission will improve its capability to receive utility notifications electronically, and will incorporate into reporting rules a provision for utilities to report electronically to the Commission.

The Staff suggested that integration of different utility systems could improve utilities' ability to coordinate and communicate outage and restoration information. BHE filed comments stating that its customer information and geographic information systems are integrated. CMP agreed generally with this suggestion, and commented that confidentiality issues would be raised if its customer information were provided to agencies other than the Commission, although during the January ice storm, CMP made such a terminal available at the Maine Emergency Management Agency (MEMA). CMP commented that it would dispatch its staff to assist MEMA "during major, multi-day outages."

We believe that use of computer-based information systems is necessary to provide outage and restoration information to government and utility management. Coordination that depends on individual staff liaisons from each of Maine's 12 electric utilities, 24 telephone local exchange carriers, over 150 water utilities, and other affected utilities is impractical except for only the largest utilities, possibly skewing emergency responses accordingly. We adopt the Staff's suggestion.

RECOMMENDATION IV-8. Utilities with several different computer systems should be able to integrate or coordinate all of these systems so that all outage and restoration information is readily available to utility managers and appropriate agencies of government.

3. Geographic Information Systems (GIS)

GIS proved a useful tool to a number of utilities during ice storm recovery. BHE identified GIS as a helpful tool in restoration management, and is planning to expand its use of GIS to support customer communications in future outage events. CMP identified a lack of circuit maps with customer conditions as a concern for restoration management. Some telephone utilities at a Telephone Association of Maine storm assessment meeting described extensive use of GIS during storm recovery.

The IHMT convened by FEMA recommended expanded use of "a user-friendly emergency planning database, with links to the GIS" for restoration management,[65] and the President's Commission on Critical Infrastructure Protection has made similar recommendations as described in Section V.C.3 below. Similar recommendations were made during ice storm assessments in other New England states.[66] GIS can assist in mitigation of the effect of severe weather events by improving analysis of maintenance alternatives (e.g., tree trimming intervals and use of "hazard tree" programs). GIS tools can also be effective in expediting storm outage restoration by providing emergency managers with rapid accurate information about facilities out of

service, areas and critical facilities affected, restoration progress, crew work locations, etc.

In March 1998, the Commission moved toward implementing greater GIS capabilities through its submission of a grant application to FEMA in cooperation with the Maine Emergency Management Agency (MEMA) and the Maine Office of GIS (OGIS) for funding to develop a comprehensive GIS database and an integrated and redundant network of primary GIS resources within MEMA, OGIS, and the PUC, related to critical utility infrastructure and facilities and populations impacted from events such as ice storms. FEMA has identified this project as one the State should consider funding from FEMA monies being made available for hazard mitigation programs.

BHE and CMP filed comments supporting the Staff's recommendation on this issue.

RECOMMENDATION IV-9. The Commission will continue to expand its GIS capabilities, and develop and maintain a GIS database of utility infrastructure and service information that emergency management agencies can use to assess needs related to utility services and set priorities for emergency responders.

One element that has slowed implementation of utility infrastructure GIS in Maine has been utilities' increasing reluctance to share detailed infrastructure information with State agencies, claiming that such information is competitively sensitive. While ratepayers arguably have a right to know what infrastructure is being placed in Maine at their expense, the increasingly deregulated market for utility services does raise concerns that some infrastructure information should be kept confidential. Moreover, full public access to detailed information about utility infrastructure would increase the difficulty of protecting critical infrastructure against terrorist or similar threats. The Interagency Hazard Mitigation Team (IHMT) convened by FEMA recommended that the PUC coordinate solutions to these concerns with the Office of GIS and MEMA, with the support of utilities.[67]

The Staff suggested that the Commission should decide the bases for protecting utility infrastructure information, and issue appropriate Protective Orders. We believe public utilities are in the best position to evaluate their own needs to protect such information, rather than the Commission.

RECOMMENDATION IV-10. Utilities should evaluate the need to safeguard infrastructure information and seek appropriate protection (e.g., legislative actions to protect infrastructure security).

The Staff suggested that utilities develop standard GIS protocols. BHE and CMP filed comments supporting Staff's recommendation, which we adopt.

RECOMMENDATION IV-11. Major public utilities and utility associations in Maine should develop a standard protocol for use of GIS to identify utility infrastructure, monitor utility service outages, and coordinate necessary response. The protocol should be consistent with GIS systems in use by the Maine Office of GIS and the Commission, and between utilities themselves to the extent possible.

E. Communications with Other Utilities

1. Communications Between Like Utilities

To a large degree, preexisting arrangements between electric utilities for "mutual aid" functioned well. All affected electric utilities beneficially supplemented their restoration work force through those arrangements, which vary significantly by utility. Some utilities (e.g., EMEC) did not request mutual aid assistance until the storm damage was severe, however, delaying complete restoration. BHE identified early notification of supplemental work crews as important to its restoration efforts. EMEC advised that considerable time was saved by supplying mutual aid crews with recommended clothing and equipment lists in advance, and BHE identified this as an area for improvement in its planning.

Telephone utilities with out-of-state affiliates (e.g., Bell Atlantic and Northland Telephone Company) received assistance from those affiliates. Telephone utilities that do not have affiliated resources in other areas received help following an Emergency Assistance Guide developed by the Telephone Association of New England.

In all cases but one, utility efforts to restore service to Maine customers were managed from within the state. Bell Atlantic initially opened a local command center in Portland, but when the company identified regional characteristics to the event, it consolidated management of the restoration on a regional basis, directed from a regional command center in Boston. The centralization of coordination in Boston enabled Bell Atlantic to balance its resources between all states served. We do not have information that would allow it to assess whether this practice worked to Maine customers' advantage or detriment.

Some utilities reported that their internal communications (e.g., between restoration control points and field units) benefited from the availability of cellular

telephones. Mutual aid crews generally do not share communications practices and frequencies as the areas in which they are called to assist; EMEC recommended that mutual aid crews be equipped with cellular telephones to improve coordination. Some cellular telephone systems, however, also failed during the ice storm due to damaged towers and problems refueling emergency generators.[68] BHE reported that cellular service in Hancock and Washington Counties was unable to support its recovery efforts in those areas. The Bethel Water District also reported that cellular service was not available as needed during recovery operations.

RECOMMENDATION IV-12. All utilities should identify alternate communications methods for restoration in major outages, and incorporate those alternatives in emergency plans.

2. Communications with Other Types of Utilities

During restoration efforts, coordination between utilities providing different types of utility services was minimal. Electric company restoration efforts were often not coordinated with water and telecommunications utilities in the state. Primary contacts in electric utility emergency plans were in some cases not available for inter-utility coordination, and special telephone numbers provided to some utilities for emergency use were not answered. The Bowdoinham Water District, for example, was unsuccessful in attempting to contact CMP on numerous occasions during storm recovery operations. In some instances, this lack of coordination was probably directly responsible for delayed restoration of services by other utilities. Absent improved coordination, such a lack of communication could affect the public health and safety in future emergencies.

The degree of coordination between different utilities varied widely. Mid-Maine Telecom advised of good communications with BHE, particularly in field situations, but Northland and Standish Telephone Companies reported difficulty coordinating with power crews in their areas. While the Paris Utility District, Bangor Water District, Great Salt Bay Sanitary District, and Jackman Utilities District reported that local electric utilities were supportive in maintaining those utilities' electricity supply, the Brunswick and Topsham Water District advised that CMP denied that utility's request for priority restoration. Saco River Telegraph and Telephone Company advised that it had difficulty communicating to CMP that only part of a three-phase line that CMP apparently believed had been restored was actually in service.

Most telephone companies had problems communicating and coordinating with power companies, primarily CMP. Perhaps the most consistent finding in the independent

telephone companies' reports is their problems coordinating their service restoration efforts with CMP. The emergency personnel contacts the companies normally deal with did not answer their telephones; they were all out in the field. As a result, the independent companies had to use CMP's public access lines, which was not effective. Another problem identified by telephone utilities was CMP's inability to provide any estimates of when power would be restored to locations that had telephone outages.

A consensus of incumbent local exchange carriers (LECs) participating in a statewide retrospective meeting on the ice storm suggested that both Bell Atlantic and independent LECs be represented at statewide restoration command posts to improve coordination between electric and telecommunications utilities. The Telephone Association of Maine (TAM) offered to coordinate communications among independent LECs during emergencies. Some telephone utilities suggested that electric utilities provide a special telephone access number for other public utilities for direct communication during emergency restoration.

After the storm, Bell Atlantic provided electric utilities with locations of field equipment dependent on commercial power to maintain communications, and requested priority restoration to those locations.

In some cases, the lack of coordination between utilities resulted in additional damage to both underground and aerial utility facilities not directly damaged by the storm.[69] In limited situations where such coordination was in place (e.g., when a Bell Atlantic representative was dispatched to CMP's storm restoration control center on Saturday, January 10th), coordinating utilities acknowledged benefits from the effort.[70]

Some utilities' restoration efforts were impaired by the loss of services provided by other utilities. For example, a CMP facility in Bridgton being used during the restoration process suffered a loss of communications when a Bell Atlantic digital loop carrier system when its backup batteries discharged. BA-ME reported that extended power outages at its garage locations affected its ability to communicate and maintain essential services during the recovery effort.

The Staff suggested that when electric utilities activate emergency centers, they should notify Bell Atlantic and the Telephone Association of Maine and invite them to provide a restoration liaison. The Staff also suggested that electric utilities arrange to communicate restoration information to other affected utilities. In its comments filed on this issue, BHE stated it did not plan to add such a procedure to its ERP because that plan incorporates listings of "critical facilities" of other utilities. The January ice storm demonstrated that direct communications among electric and telephone utilities during

major outages is critical for coordinated restoration of services. We adopt Staff's recommendations.

RECOMMENDATION IV-13. *When electric utilities activate emergency centers to coordinate response to natural disasters such as the ice storm, they should notify both Bell Atlantic and the Telephone Association of Maine (TAM) and invite each organization to provide a liaison at their emergency control centers during restoration activities.*

RECOMMENDATION IV-14. *Electric utilities should arrange with other utilities (e.g., water and telephone utilities) for direct contact to provide restoration and work estimates to those utilities when they cannot restore their own services due to a lack of utility-provided power.*

RECOMMENDATION IV-15. *All utilities should install alternative power supplies for their facilities and equipment needed to restore service to customers (e.g., garages, pump stations, standpipes, fuel stations, remote switching equipment, etc.).*

F. Communications with Customers and the Public

During ice storm recovery, utilities were often unable to communicate effectively with their customers. This was reflected both in communications directly with customers via telephone contact, and in indirect communications using mass media. This section of the Order addresses each of these modes of customer communication.

1. Communications Directly with Customers

Utility customers communicate extensively with utilities to report outages and obtain information about restoration of service. Lack of direct communications between utilities and their customers was a source of major concern for many customers during the January 1998 ice storm. Customers were also concerned about information provided about their responsibility to maintain and repair their service entrances, and the priority afforded to customers with medical conditions.

a. Outage Reporting

Maine utilities depended heavily on customer reports to identify the location and extent of outages during the January ice storm. Some of that information, however, is automatically available to utilities through supervisory control and data acquisition (SCADA) and network monitoring systems.

i. Central Maine Power Company

CMP stated that effective call forecasting and scheduling at its call center resulted in few customers who called having to wait in queue. CMP uses an automated telephone answering system, "21st Century," to answer outage calls during major storm outages when its "live" and interactive voice response (IVR) systems become saturated with calls.

The 21st Century system, located out-of-state, can handle up to 5,000 concurrent calls depending on regional circumstances and loads. Callers reaching the 21st Century system are connected to an automated system that is designed to create work requests automatically, and enable the caller to reach a "live" in-state contact only if the caller declares a life-threatening emergency. The system provides no restoration information to customers.

Although CMP describes the 21st Century system as a "high volume overflow service," CMP uses the system to replace, rather than supplement, "live" CMP call center call answering. The system allowed customers to report: no power, lines down or damage to CMP equipment, and life threatening emergency situations. Only for life threatening emergency situations were customers able to opt out of the automated system and speak with a live person through 24 hour coverage at the call center. CMP reported that its personnel spoke directly with any person reporting an emergency life-threatening situation during the ice storm. Different issues faced customers with Life Support designation, as discussed in Section IV.F.1.d below.

The 21st Century system took more than half a million calls from CMP customers during the two week period. CMP advised that this call volume was more than any utility has ever taken during a storm-related emergency. Of these half million calls, less than 74 thousand were redirected to CMP.

CMP reported that 21st Century worked extremely well, allowing customers to reach CMP without busy signals or long delays throughout the storm, despite extraordinary call volume. The 21st Century system took almost 200,000 calls during the first full day of the storm, and 35,000 calls during the peak hour of calls. CMP stated that having the 21st Century system helped keep call representatives available to take emergency calls. CMP did not provide any information on the number of personnel available to handle these emergency calls, or if all of the redirected customers were able to talk with someone at CMP when their calls were redirected.

CMP felt it important to reallocate resources that would have been placed in the call center to other

work activities, but became aware that customers were "pretty upset" with the lack of information available from the automated system.[71] Ten days into the storm the call volume had reduced to the point where CMP started relying exclusively on call center representatives and emergency telephone center personnel to process calls. CMP used this personal contact method of communicating with customers until the second phase of the ice storm when CMP reactivated the 21st Century system.

Some customers complained that they called in to CMP's 21st Century system but they later found that CMP had no record of their call. Other customers complained that the system would not accept their account number or telephone number, and because they were unable to opt out of the system and reach an operator, they could not report their outage. There are still a significant number of telephone customers without "touch-tone" telephones or whose ability to dial sufficiently rapidly during outage circumstances exceeded the time allowed by the system.

The Staff suggested that utilities check their systems for recording accuracy and "user-friendliness." CMP filed comments agreeing in general with these Staff recommendations, which we adopt.

RECOMMENDATION IV-16. *Utilities using automated outage reporting systems should check these systems to insure that they are properly recording all of the outage calls they receive.*

RECOMMENDATION IV-17. *Utilities using interactive voice response or similar systems should ensure they are "user-friendly."*

CMP advised that it purged its work management system (WMS) when primary lines were restored in an area, then requested broadcast media to ask customers in the affected area to call in again if their service was not yet restored so that the utility could identify individual service locations where additional work was required. This method of identifying areas out of service was effective only where customers had not evacuated their residences or businesses, and where customers were monitoring broadcast stations. During the ice storm, many customers were not at the service locations to report remaining outages. BHE observed that customer callbacks in its service territory were low under these circumstances, due to customer evacuation. Broadcast advisories could not reach many affected customers because of interrupted broadcast transmission and customers' temporary relocation during the storm.

In comments filed on this issue, BHE stated that it selectively reset "groups of records" during the January ice storm because it could not contact many customers who

may have moved to alternate living quarters during the storm. CMP stated it "does not routinely or automatically purge calls," but commented that it used "selective board purges and public requests for confirmatory call-backs" during the ice storm. We believe that deleting a customer outage report should be performed only after confirmation that service has actually been restored, and that blanket purging of reports should be done only as a last resort. Utility systems should be upgraded where reasonable to support this principle.

RECOMMENDATION IV-18. Electric utilities should not automatically "purge" customer outage reports from work management systems or rely on customer callbacks to identify areas needing further work.

ii. Bangor Hydro Electric Company:

BHE answered customer outage calls "live." The highest percentage of calls answered during the storm was 98.1%, and the lowest percentage of calls answered was 90.7% during the first day of the storm. The highest number of calls was received (7,187) on the second day of the storm. The longest average time customers calls were in queue was 93 seconds. BHE did not do a busy study, but anecdotal information received by BHE suggested many customers received busy signals.

iii. Eastern Maine Electric Cooperative

EMEC also answered calls "live." EMEC has a detailed computer model of its distribution system, with all customers being assigned to substation, feeder and line sections. EMEC is in the early planing stages of deploying an outage reporting system which would use customers' outage reports called into the utility by telephone, but also include automatic reports from meters located in the field, to expedite its assessment of the extent of future outages.

b. Restoration Information

After the first few days of the storm, most customers were no longer calling in to report outages, but were seeking restoration information. More detailed restoration information provided through the media could possibly help to reduce the large number of these calls. Customers need to know that their service may not be restored for days or weeks so that they can make decisions such as whether to leave their residence and go to a shelter, purchase a generator or take some other action. Customers complained that they did not get this information soon enough during the ice storm. Many radio stations were off the air because of storm damage, making it even more difficult for utilities to communicate information to customers.

Further complicating restoration forecasting, utilities frequently could not fully assess the extent of the damage in an area until they physically surveyed the affected areas. In some areas, this was difficult (if not impossible) for several days because of weather conditions and the extent of the damage. When utility personnel were able to reach these areas, the damage was often found to be worse than originally believed, and required a more extensive effort for repair and to restore service than the utility had previously anticipated.

Providing customers with restoration information requires a delicate balance. Sufficient information must be provided as soon as possible to enable customers to make decisions regarding evacuation, generator purchases, etc. That information, however, cannot be so specific that it commits a utility to an unreasonable restoration time, or misleads customers. There should be enough room in the restoration forecast provided to customers to allow for unforeseen delays in the restoration effort. This is especially important during major storms when service may be interrupted more than once due to ongoing or repetitive damage caused by the storm.

i. CMP

Although CMP's outage reporting system appears to have worked well for customers reporting outages, it did not meet the needs of customers calling to obtain restoration information. Several days into the storm, the number of calls coming into CMP's outage lines was still high, but many, if not most, customers calling had already reported their outages and were calling again to obtain information on restoration that they could not obtain from the outage reporting system.

CMP previously recognized the importance of providing customers with restoration information in response to a Hurricane Bob recommendation that "Service Centers should feed appropriate information to the Call Centers so that telephone staff can give customers an idea when power will be restored." CMP's report on the January ice storm acknowledged that daily restoration plans were provided to call centers "[a]s soon as 21st Century was turned off." [72]

Another Hurricane Bob recommendation was that "ECC personnel should be CSS trained to give customers more information." In its report, CMP noted that "[t]he ECC is now obsolete with the implementation of the 21st Century system," but did not explain how the recommendation that customers be given more information will be met under the new system, which does not provide any such information.

CMP forecasting of restoration by circuit was helpful for customer service representatives (CSRs) to keep customers informed. CMP found that it was better to assign one person the responsibility for retrieving and disseminating storm related statistics. After CMP's automated telephone answering system was turned off, CMP's service centers provided restoration plans daily for call center personnel to use to answer customer inquiries.[73] The restoration plans included estimated dates of restoration of three-phase, primary, and service cables, as well as major (3 or more crews) and minor (less than 3 crews) presence of crews in town. This data was also provided for use in press releases.

CMP observed that its customer service representatives (CSRs) needed a better understanding of the storm restoration process. CMP intends to appoint its Managing Director of Customer Service to direct the emergency operations center when it is activated. CMP also found that integrating its diverse data systems would enable it to provide comprehensive storm management information company-wide.

CMP needs to assess the timeliness and amount of restoration information provided to its customers during the ice storm to determine how to provide more detailed information to customers sooner without limiting CMP's ability to perform outage restoration as it needs to.

The Staff suggested that CMP establish a separate telephone number for customers to call to obtain restoration information. The Staff further suggested that outage reporting and restoration information should be separate.

In comments filed on this issue, CMP stated that its goal has been "to avoid a customer's getting a busy signal when calling CMP; other goals including providing as accurate and timely restoration information as circumstances reasonably allow." CMP advised it is exploring expanded use of its 21st Century automated outage reporting system, and suggested it was focusing on providing "more customer-specific information . . . in the last few days of a major restoration effort."

We identified provision of restoration information to customers as a priority in the aftermath of Hurricane Gloria in 1985: "We particularly wish to emphasize the importance of disseminating information concerning the timing of power restoration which is specific by area." The importance of providing restoration information to affected customers has not diminished in the past 13 years, but as the ice storm demonstrated, this issue remains a high customer priority throughout major outages, not just during cleanup activities near the end of such outages.

We are not inclined to adopt Staff's recommendation that all utilities maintain separate contact lines for outage reporting and restoration information, however. While that may be the best solution to attain our goal, utilities are in a better position to determine which particular operating practice is the best mechanism for them to improve provision of restoration information, especially if in-place systems can be upgraded to provide that information adequately.

RECOMMENDATION IV-19. Utilities should improve provision of restoration information to customers during major outages, through improvements to existing systems where possible.

The Staff reported that customers were upset during the January ice storm when unable to reach a "live" person when calling utilities that had switched all incoming calls to an automated answering service and allowed customers to reach "live" customer service representatives only if they declared a life-threatening condition. The Staff suggested that utilities should answer as many calls "live" as possible.

In comments filed on this issue, CMP confirmed Staff's understanding: "When the call volume exceeds the capability of CMP's telephone infrastructure, . . . managers consider switching over to the 21st Century IVR system. When 21st Century is activated, customers speak with a live voice only if they have indicated a life-threatening situation."

Automated overflow systems such as the CMP 21st Century system should be used only to supplement a utility's ability to take outage calls from customers, not to replace existing live-response systems in their entirety. Overflow systems should be used for overflow calls only, not for all customer calls directed to a utility during major outage reporting periods.

We recognize that during major outages, utilities must manage their resources to address conflicting priorities, and need flexibility to reassign personnel where necessary. We thus add a condition to Staff's suggestion that address work priorities.

RECOMMENDATION IV-20. Utilities should make restoration information systems available that allow for as many calls as possible to be answered "live" with only peak overflow directed to an automated information system, unless work priorities require reallocation of available resources.

ii. BHE

BHE stated its belief that customers call during an outage for two reasons: to make sure the company

knows they are without power, and to find out when power will be restored. BHE believes it has a sufficient number of telephone lines to obtain sufficient outage reports to manage service restoration. It had to reconfigure its 23 lines during the storm to allow for greater capacity for receiving incoming calls, although this reconfiguration created a limitation on outgoing capacity. BHE is evaluating the need for additional telephone lines and the personnel to answer them. It is also evaluating the possible benefits of subscribing to a third party call overflow answering service that could notify BHE of customer outages. BHE is concerned that neither of these solutions may be worth the ongoing expense involved.

BHE felt its information system worked well overall. During the first few days of the storm the response time of the outage systems was a significant issue, with ad hoc queries of the database becoming a problem. BHE was able to address several internal issues within the first 48 hours, which significantly improved the response time.[74]

According to BHE, the ease of use of its computer information systems contributed significantly to the utility being able to quickly train additional personnel to assist in answering and processing of outage related calls. BHE was able to train personnel in the use of the computer system in about an hour. BHE is considering more cross-training of its personnel to facilitate quicker response.

BHE used volunteers on an ad hoc basis to supplement its staff who were answering customer calls. BHE found the volunteer concept to work extremely well and is considering reactivating its volunteer list, developed several years ago, that it believes will help improve the efficiency of the volunteer effort in the early days of a major outage.

BHE's storm coordinator met with customer service center (CSC) supervisors and public relations personnel in a daily status meetings to lay out the strategy and priorities for the next day. BHE recommended that this ad hoc meeting be included in its restoration plan as a formalized process.

BHE's assessment of its performance in this area during the ice storm resulted in a recommendation to improve the flow of information. BHE believes that establishing a restoration information clearinghouse where division line departments report restoration progress and the CSC can obtain the latest available restoration information will help to improve the flow of information. An information clearinghouse would advise the CSC to change data collection when necessary, by advising the line departments of what data is needed.

The full implementation of GIS, with a GIS monitor installed in the CSC, will also help to improve the flow of information, by having continuously-updated outage data displayed on the GIS monitor. BHE believes that these improvements will help to improve its ability to provide customers with timely reliable information concerning when power will be restored, because the CSC will readily be able to obtain the most up-to-date information.

iii. EMEC

EMEC believes that the new outage reporting system it is planning to install, along with an improved telephone system, will enable EMEC to keep its membership better informed of restoration projections. EMEC felt that their existing telephone system performed relatively well during the storm but was inadequate to handle a large volume of calls over an extended period of time. EMEC believes that a system that provided for more automated messaging would be helpful.

iv. BA-ME

As the trouble load grew, BA dispatch personnel attempted to call customers with reported troubles to keep them informed of the progress of their trouble report. BA had 9,500 trouble reports, and due to the volume of trouble calls, BA had a very difficult time informing individual customers. BA advised its street-by-street restoration method allowed customers to track its restoration efforts.

v. Independent Telephone Utilities

Most independent telephone utilities reported that their employees were kept up to date on outage and restoration information so that they could respond to customers who contacted them. Although most telephone companies reported that they had developed ways to communicate with their customers, few companies reported using, or trying to use, all media available. The broad-based process used by Utilities, Inc. companies could serve as a useful model for other utilities.[75]

vi. General

Customers complained of not being able to get through to their utility in the case of BHE, and not being able to talk to a live person in the case of CMP. BHE is evaluating a third party answering system similar to what CMP used, and the use of volunteers to take customer outage reports and answer customer questions. The use of automated outage reporting systems is useful in some situations, although

customers clearly prefer live contact with utility personnel whenever possible.

CMP was clearly receiving more calls than it ever could have handled by having just its personnel answer the outage calls. However, its reliance on an automated outage reporting system for ten days before customer representatives answered the calls upset a large number of customers who could not reach anyone at the utility to obtain information or ask questions. BHE's use of volunteers to take outage reports and provide customers who called with restoration information was an innovative and apparently beneficial approach.

Although all the utilities have attempted to improve communications with their customers, there remains the continuing problem of providing customer-specific responses to the question, "When will my power be restored?" If customers had reasonably good estimates of restoration time, they could react in ways that would reduce costs and hardship. For example, they could make decisions about fuel supply, oxygen supply, food in freezers, pipes freezing, portable generators, whether to go to a shelter, etc.

The IHMT convened by FEMA recommended that utilities, during prolonged outages, "rather than recorded messages, use telephone customer service representatives who can answer questions with accurate outage information." [76]

BHE intends to have its new "Banner" computer system provide more information to its CSRs and expects its GIS system to reflect distribution line status. CMP plans to upgrade its WMS to identify outages by circuit rather than by service area. EMEC intends to install automatic outage reporting devices on their distribution lines. These approaches all have merit and should be adopted if cost effective. They are intended to provide more accurate and timely information to utility personnel so that important tasks can be performed more efficiently, and the duration of outages can be reduced.

None of these recommendations, however, answer to the customers' critical question: "When will my power be restored?" Part of the problem is knowing where customers are located. A second factor is knowing the repair status at that location. Third is the problem of communicating the right information to the right customer.

A universally understood method should be developed for a customer to provide location information automatically to the utility. One way would be for the customer to know and provide the circuit number of the distribution line that serves his/her property. If the circuit number were shown on the customer's bill, or otherwise provided by the utility, the

customer could tell the CSR or key the number into an IVR system. The CSR or IVR could be programmed to answer with the appropriate up-to-date restoration status for that circuit.

The process could be entirely automated by an IVR through relating the customer's telephone number to his/her circuit number, and providing the appropriate response. Of course, if the call was made from another location, the response would be for the other location rather than for the location in question. One possible solution would be to ask a customer to key in the telephone number of the service location if different from the location that the call is placed.

In comments filed on this issue, CMP stated its belief that "improvements now under consideration will address in a realistic manner the issues raised" by the Staff. CMP stated it "can improve its responses, and is adopting a number of changes based on internal and Staff observations."

While CMP may be making some improvements to its system, improved communications between utilities and others is needed on a broader basis than just within one utility. Sharing of experience on communications issues between utilities would be beneficial. We adopt Staff's suggestion.

RECOMMENDATION IV-21. The Commission will conduct a further inquiry into the communications between utilities and their customers and restoration priorities during major outages. This inquiry will address provision of restoration information, support systems including personnel and other resources, and consumer education. The inquiry will incorporate utility communications with customers, other utilities, government, and the media.

The Staff suggested that utilities consider how to communicate with customers if telephone services were interrupted. CMP commented that it "would continue to use radio as the primary means to communicate with customers" and "will also strengthen ties to emergency-management leadership, particularly at the county level." All utilities should develop alternatives such as those outlined by CMP.

RECOMMENDATION IV-22. Utilities should develop a contingency plan to provide for continued communications with customers if normal telecommunications services are not available.

The Staff suggested utilities improve use of division personnel where possible to decentralize provision of information to customers, perhaps using volunteers to supplement regular employees. CMP commented that it "assigned personnel at

each Service Center to meet with and answer questions of customers who chose to travel to the Service Center."

Utilities should improve provision of information already existing at division offices to customers in those areas where possible, and not require that customers actually travel to those offices to obtain that information. We encourage utilities to suggest further ways of using division personnel to assist during major storm activities.

RECOMMENDATION IV-23. Utilities with division offices should make greater use of division personnel to answer customers' questions and provide customer information to customers in the division's area, perhaps using volunteer staff.

The Staff suggested that utilities supplement their own personnel with volunteers to improve person-to-person contact with customers during major storms. CMP filed comments on this issue stating it "made extensive use of volunteers during the January ice storm" for "child care, cafeteria work, and other vital duties."

Volunteers, including utility retirees, can be a much more valuable resource to utilities. Other utilities have made beneficial use of retiree resources in areas heavily stressed during major outages, including customer communications areas. We adopt Staff's suggestion.

RECOMMENDATION IV-24. Utilities should recruit and train a volunteer work force to supplement its own personnel to enable greater person-to-person contact between customers and knowledgeable utility representatives.

The Staff suggested that utilities consider printing information on all customer bills that would identify the specific circuit, feeder line, main, etc., providing service to the customer's location. The Staff suggested that customers should be advised to call a special number and give their circuit or other service and location identifying number to receive current service restoration information.

BHE and CMP filed comments on this issue disagreeing with the Staff's suggestion. BHE advised that [t]his information is too dynamic for the use intended in the recommendation," and CMP stated that "[p]roviding specific circuit information would not provide the intended benefit."

We do not adopt the Staff's recommendation on this issue. Other more reasonable avenues to facilitate provision of restoration information to customers should be

explored as part of the communications inquiry we will conduct, as described in Recommendation IV-21 above.

RECOMMENDATION IV-25. Staff recommendation not adopted as described above.

RECOMMENDATION IV-26. Utilities should ensure that computer databases for outage reporting are simple so that personnel can quickly and easily be trained on them. Utilities should train as many staff personnel and volunteers as possible on these systems so that a pool of resources is ready when needed.

The Staff suggested utilities improve their provision of restoration progress information to customers. BHE filed comments stating that its revised ERP "will facilitate better communication of information with the implementation of a central command center." We adopt the Staff recommendation.

RECOMMENDATION IV-27. Utilities should develop a better process for keeping customers informed of restoration progress.

c. Service Entrance Repair

Customers have certain responsibilities to repair damaged electric service entrances. They should be provided with information in advance about their responsibilities for maintaining and repairing weatherheads (service entrances) and meter boxes. The storm pulled many service lines, weatherheads and meter boxes from buildings and for customers of electric utilities that did not reattach the weatherheads and meter boxes, restoration of service was delayed due to customers not being told soon enough that they had to arrange for an electrician to repair and reattach the weatherhead before service would be reconnected. The service to some areas was restored within a few days but some customers in those areas waited several days to a week longer to have their service restored, because they were unaware that they had to arrange to have their weatherhead and meter box repaired by an electrician before the electric utility would reconnect their service.

BHE meter technicians repaired damaged service entrances when found, and EMEC field meter readers coordinated with customers' own electricians to reduce the workload on centralized dispatch. The Legislature recently authorized utility personnel to perform these activities.[77]

The Staff recommended that electric utilities reattach service entrances where cables and meter boxes were not damaged. BHE filed comments stating that it "operates just as recommended," but that meter operations personnel that perform these functions are "currently at risk pending the outcome of the

restructuring of metering and billing." CMP commented that it "made every effort to reattach service entrances" during the ice storm. CMP noted that coordination of electrician services could slow "the overall restoration effort." We do not wish to lengthen storm restoration efforts, and will qualify Staff's suggestion to reflect CMP's comment.

RECOMMENDATION IV-28. During service restoration efforts related to major storms, electric utilities should reattach service entrances to customer premises unless entrance cables or meter boxes need replacement. Utilities should survey customer service entrance equipment. Utilities should coordinate electrician services when possible if such coordination will not delay overall restoration efforts.

d. Life Support Customers

Some utilities prioritized restoration of service to customers with medical emergencies ("Life Support") and others did not. CMP reported that Life Support customers could not be given priority restoration, but that it made attempts to contact affected customers.

Some independent telephone utilities sent personnel to all customer locations that had been pre-identified as having a medical emergency situation, in order to ensure the customers' safety. These personnel could verify that a medical emergency situation still existed and advise these customers of the expected duration of the outage.

This lack of consistency between different utilities serving the same customer base can cause confusion among customers. These customers should be provided with information necessary for them to take needed steps when such an emergency occurs, such as installing a generator or having an alternative location to move to during the outage.

Many customers with designated medical emergencies and or Life Support designation may naturally assume that they will have priority during the service restoration process, so it is important to make sure that they clearly understand the service restoration process and how their service fits into that process. Not all utilities employ the same criteria or definitions that would result in Life Support designations. Different criteria between utilities and service areas, and the lack of continual maintenance of Life Support designation lists may be a cause of confusion for some customers.

The Staff suggested that utilities notify customers with medical emergencies about service restoration efforts that would affect them. BHE filed comments stating it

plans to "implement the direct contact of life support customers during periods when the Company has activated the Emergency Operations Plan." BHE noted that "a significant increase in the number of life support customers may change this ability." CMP commented that its LifeLight Program was developed to provide information on planned outages to about 900 customers with critical needs, and is developing procedures for unplanned outages and communicating those procedures to LifeLight customers. We encourage all utilities to develop such plans as soon as possible.

RECOMMENDATION IV-29. Utilities should develop notification procedures to advise customers with pre-existing medical emergencies or that have utility Life Support designation of when they can expect restoration of their service. Utilities should outline these procedures in writing and provide them to affected customers upon their designation as Life Support customers, and on an annual basis thereafter.

The Staff suggested that the Commission set standard criteria for the designation of life support customers. CMP filed comments on this issue suggesting that the criteria include both life support equipment and also other "medically necessary equipment such as SIDS monitors." We will ask our Consumer Assistance Division to consider what criteria should apply, and to suggest amendments to our rules if appropriate.

RECOMMENDATION IV-30. The Commission will consider standard criteria for designation of Life Support customers.

2. Communications with the Mass Media

As mentioned in the previous section on communications between utilities and their customers, utilities made extensive use of mass media to communicate with customers. One issue that occasionally led to confusion was the term "customer," which some media outlets interpreted as meaning the actual number of persons affected by an outage. "Customers" is generally interpreted to mean customer service accounts or electric meters, not individual persons. A rough rule of thumb is that, on average, 2.5 persons are served through each customer account or meter.

BHE filed comments stating it plans to categorize outages in terms of "metered services off," and CMP commented that it proposes to use "customer accounts" in future outage reports.

RECOMMENDATION IV-31. Utilities should use the terms "accounts" or "meters," instead of "customers," when advising media of the extent of outages or restoration activities.

a. Central Maine Power Company

CMP reported that it communicated regularly with customers, keeping them updated on the status of restoration efforts. CMP Corporate Communications distributed updated press releases with outage numbers at least three times a day. Corporate Communications focused on two areas: maintaining clear and frequent communications with customers via the news media and promoting internal communication among employees.

CMP ran ads in the media (radio, TV, and print) advising customers of what to do in the emergency, warning of downed power lines ("No line is safe to touch -- ever!"), and updating customers on restoration efforts. To the extent that radio or television stations were unable to broadcast because of power (or other) failures, and that customers may not have had receivers capable of functioning without commercial power, these communications may not have been highly effective. Radio ads with CMP President David Flanagan started running within a few days of the beginning of the outages. These ads discussed what customers could do to minimize their hardship during the outages.

CMP provided 18-hour or longer media coverage each day when CMP personnel were available to answer media questions. CMP used the radio to communicate with customers who lived in areas that did not have power. CMP initiated contact with key radio stations and tried to contact those stations on a regular basis. Some radio stations were not able to broadcast for several days due to storm damage. CMP reported that it designated a media contact person at each division headquarters to handle media inquiries, but did not use them during the ice storm to the extent it could have.

b. Bangor Hydro Electric Company

BHE placed ads in various media advising customers what to do in the emergency. BHE provided brochures on preparation for outages to its customers on a periodic basis. Early during the recovery effort, BHE tried to respond to random media calls but quickly realized that this process was not working well. The utility then began issuing advisories on a regular basis. This allowed BHE to put more focus on responding to special requests, rumors and reports as they occurred. BHE reported that the media assisted it by broadcasting timely restoration information. BHE used two primary radio stations and had ongoing live call-in programs, and on-camera interviews with TV stations. BHE also used print media to provide information to the public.

BHE Public Affairs was available around the clock and was responsible to coordinate all press releases on a

regular basis. Media calls were directed to Corporate Communications, which was available extensively to media throughout the storm. BHE's President acted as a public spokesperson.

During future such events, BHE plans to hold multiple daily live briefings at their corporate headquarters and supplement those briefings with fax updates. By doing this BHE hopes to cut down on the number of individual requests for follow-up information.

c. Eastern Maine Electric Cooperative

The ice storm was the first time EMEC systematically kept the public well informed through the news media. EMEC provided updates on its progress to the radio stations every few hours. EMEC used its Member Communicator as its media contact person. The Member Communicator also gives timely updates to the Board President who then can answer questions from individual members, who can advise Co-op members who have called them for information. EMEC advised that its use of Member Communicators worked well, and proposed having a retiree available to monitor the media for unaddressed community concerns.

d. Bell Atlantic

During the initial period of storm restoration, BA contacted the Associated Press to inform and update them as to the number of lines out of service. As the outage progressed, BA relied on its "street-by-street" restoration method to keep customers informed. BA issued a newspaper advertisement in local Maine daily newspapers that provided information about recovery efforts, storm damage and encouraged customers to report troubles.

e. Independent Telephone Utilities

Some independent telephone companies contacted local media, TV and radio, and provided prepared statements concerning outages and the restoration effort. It was reported that the prepared statements provided radio stations were run but some statements provided to TV stations were not run. Other companies did not contact the media but stated that they would do so in the future.

V. AFTERMATH

This section of the Order describes the costs of utility recovery from ice storm damage as estimated by the affected

utilities, and related cost issues. This section also summarizes post-storm assessments and recommendations made by the utilities themselves, and lists extensive recommendations made by other government and industry organizations related to ice storm events.

A. Incremental Cost Estimates

Maine public utilities estimated about \$70 million in incremental expenses associated with the damage incurred from the major ice storm of January 1998. The Commission issued accounting Orders for Central Maine Company (CMP) and Bangor Hydro-Electric Company (BHE) that allowed those utilities to defer the incremental costs associated with this storm.[78] Some other utilities experienced smaller incremental costs and received Federal Disaster Relief funds or had insurance to cover these costs removing the need for accounting orders granting deferral authority.

Subsequent to the Commission's accounting orders for CMP and BHE, the federal government approved \$130 million in disaster relief funding associated with this and other natural disasters within the United States.[79] However, at this time, it is not clear how much funding will be received by Maine utilities. High demand for the limited funds may significantly restrict the amount of funding available. Once utilities have received federal funds, those funds will be used to mitigate the incremental costs that may be collected in rates.

Table 3 shows incremental expenses reported by affected utilities.

TABLE 3
INCREMENTAL ICE STORM EXPENSE

	INCREMENTAL EXPENSE
ELECTRIC UTILITIES:	
Bangor Hydro-Electric Company	\$4,592,312
Central Maine Power Company	50,669,277
Kennebunk Light & Power Company ¹	18,000
Madison Electric Works ²	24,000
Eastern Maine Electric Cooperative	252,427
SUBTOTAL, ELECTRIC UTILITIES	\$55,556,016
TELEPHONE UTILITIES:	
Bell Atlantic - Maine ³	12,571,842
Bryant Pond Telephone Company	10,495
China Telephone	60,000
Cobbosseecontee Telephone	15,000
CommTel	62,000
Maine Telephone (est.)	210,000
Mid Maine Telephone	29,748
Northland Telephone	338,227
Oxford County Telephone and Telegraph Co.	94,439
Oxford West Telephone Company	104,942
The Pine Tree Telephone and Telegraph Co.	70,984
Saco River Telegraph and Telephone Company	65,000
Standish Telephone Company	130,000
TDS Telecom ⁴	190,227
Unitel	210,000
SUBTOTAL, TELEPHONE UTILITIES	\$14,162,904
WATER UTILITIES (AGGREGATE)⁵	222,398
TOTAL ESTIMATED STORM COST	\$69,941,318

¹ Cost received through telephone contact.

² Cost received through telephone contact.

³ BA-ME expects \$8,500,000 of this amount to be reimbursed by insurance.

⁴ TDS expects \$142,741 of this amount to be reimbursed by insurance.

⁵ Water utility expenses do not include all costs associated with the ice storm; a number of the water utilities did not report costs to the Commission, and others only reported a portion of the costs, such as non-labor. Many did not report the cost of fuel for backup generators.

Table 4 below shows a breakdown of incremental expenses estimated by the utilities whose costs comprise most of the total. Over \$41 million, about 60% of all estimated incremental costs of the ice storm, were the costs for outside labor (including both contractors within the state and outside utility and line clearance crews).[80] The table also shows the number of

TABLE 4**INCREMENTAL ICE STORM COSTS (SELECTED UTILITIES)**

Category	CMP	BHE	EMEC	BA-ME	TOTAL
Number of Poles:	3,172	324	60	314	3,870
Cost of Material & Supplies	\$1,067,631	\$109,595	\$15,283	\$1,077,579	\$2,270,088
Cost of Rented & Leased Equipment	82,880	586,888	0	1,910	671,678
Cost of Labor:					
Inside Labor, Straight Time	183,499	46,116	0	7,654,978	7,884,593
Inside Labor, Overtime	5,790,285	914,572	94,834	2,201,567	9,001,258
Outside Labor	38,743,973	2,008,758	108,703	288,566	41,150,000
Total Cost of Labor	44,717,757	2,969,446	203,537	10,145,111	58,035,851
Cost of Meals and Lodging	2,294,695	198,344	7,231	478,151	2,978,421
Other Costs	2,506,314	728,038	26,376	869,091	4,129,819
TOTAL COSTS	\$50,669,277	\$4,592,312	\$252,427	\$12,571,842	\$68,085,858

utility-owned poles replaced during the storm.

Some of these costs are estimates, in part because some cost allocation issues remain unresolved. One example is that CMP's Work Management System automatically allocates 95% of labor and transport expenses to maintenance, and CMP plans to reallocate the 95:5 maintenance-capital breakdown to 90:10 for ice storm expenses. Another example is that line clearance costs performed by electric utilities during major storm events are frequently shared between the electric utilities and telephone utilities through case-by-case agreements. No agreement on sharing these costs has yet been reached for costs related to the January ice storm, and we understand that the magnitude of those costs (estimated by BHE to be about 10% of its total incremental costs) may make these negotiations difficult.

Because cost estimates were continuously being updated during this Inquiry, and reimbursement through governmental funding or insurance claims that may offset some of these costs has not yet been determined, we have not thoroughly investigated the reasonableness of these cost estimates. Such analyses will be more appropriate in the context of proceedings that would result from utility requests for recovery of these costs from ratepayers.

2. Loss Insurance

The President's Action Plan for Recovery recommended that utilities maintain disaster loss insurance for

rate stability, so that "sudden large rate increases for disaster recoveries" can be avoided. While such increases are possible in some situations, they are not a foregone conclusion.

The Staff suggested that the cost of such insurance needs to be carefully balanced against the potential benefit, and suggested such a requirement needs further analysis to determine the effects, particularly cost, that such a requirement would have on Maine utilities. The Staff recommended that we conduct an inquiry to evaluate whether private and investor-owned utilities should be encouraged or required to maintain disaster loss insurance.

BHE filed comments on this issue, proposing that the inquiry "be tabled pending resolution to issues related to distribution of funds sought by Maine's Congressional Delegation." In its comments, CMP reported it "has researched and evaluated the costs and benefits of maintaining disaster loss insurance," and that it "does not believe further formal inquiry is appropriate." CMP provided details of its research in this area, concluding that "adequate T&D coverage at an affordable price is difficult to secure" and that "self-insurance may be both more equitable and efficient for customers." CMP advised that it "will continue to actively monitor developments" for changes.

We do not adopt the Staff's suggestion, but instead recommend that large utilities perform cost-benefit analyses of disaster loss insurance, such as that reported by CMP.

RECOMMENDATION V-1. Investor-owned utilities with over \$10 million in gross annual intrastate operating revenues should perform periodic cost-benefit analyses that compare independent disaster loss insurance with self-insurance practices, and should provide those analyses to the Commission upon request. These analyses should be made not less frequently than every five years.

B. Utility Recommendations

Many Maine utilities performed some kind of assessment of their response to the storm. In some cases, utilities appointed formal teams to produce written reports of their experience and recommendations, and in other cases, utilities compiled informal comments from employees involved in storm-related activities.

1. CMP

CMP reviewed its own performance during the ice storm and included that self-assessment in its report to the Commission. In the Lessons Learned section of its report to the Commission, CMP highlighted 32 areas where it believed things went well during the storm. CMP also identified 30 areas where changes should be made and incorporated into its Emergency Restoration Plan where possible. Individuals within the company have been assigned to take action on the 30 recommended changes.

CMP believes that it was able to organize and manage a very large number of crews with great efficiency to minimize the duration of the outages and the cost of the restoration efforts. Injuries to line and tree personnel were kept to a minimum considering the adverse working conditions. CMP reported its call center operations and communications with customers worked well. The work management computer system (WMS) was able to handle a large volume of outage data and provide the service centers with helpful information. Specific recommendations contained in CMP's report are included as Appendix C to this Order.

2. BHE

Bangor Hydro provided an extensive list of recommendations that were developed through its self-assessment and reported to the Commission. Specific recommendations contained in BHE's report are included as Appendix D to this Order.

3. Eastern Maine Electric Cooperative

EMEC reported that it is deploying a new information system that includes outage-reporting meters that will speed outage reporting, and a computerized distribution system model; the company advised that it expects its new system will improve restoration forecasting.

4. Telephone Utilities

Few telephone companies documented their assessment, and most appeared to be informal. Few companies set up a post-storm performance assessment team. The Utilities, Inc. companies' assessment process was company-wide, well-documented, and could serve as a model. BA-ME set up a 23-member Maine Storm Assessment Team that addressed issues of safety, drop wire, logistics, engineering/construction, survey teams, central office, Customer Service Center, and digital loop carrier. Specific recommendations of the BA-ME team are included in Appendix H to this Order.

In May 1998, the Staff suggested to the Telephone Association of Maine (TAM) that TAM might be a useful forum for Maine's 24 incumbent local exchange carriers to share experiences and recommendations. TAM conducted such a meeting on July 16, and at TAM's invitation, two members of the Staff participated in the meeting.

5. Water Utilities

Only 23 of the reporting water utilities reported that they had done a self-assessment. While there may not have been a formal self-assessment, the responses in other areas of the questionnaire indicate that some informal assessment had been done. Many indicated that actions will be taken to improve their ability to deal with future emergencies. Key water utility recommendations are:

a. Arrange for fuel suppliers to fill fuel tanks when a major storm is forecast.

b. Develop emergency service agreements with local suppliers to insure adequate supplies and priority deliveries of supplies and fuel.

c. Ensure direct contact with an electric and telephone utility representatives so that they can determine the appropriate response to the emergency. This has been successfully accomplished, in some cases, by the designation of a contact person with an emergency telephone number.

d. Contact fire chief(s) in the water utility service area and request that the fire department conserve potable water by drawing from surface waters, if possible, during power emergencies.

e. Develop an emergency response plan or improve existing plans. Specific recommendations made by the Portland and Bethel Water Districts, included in Appendix G to this Order, may be useful input to those planning activities.

f. Work with electric utilities to designate water facilities as a public health priority for restoration of power.

C. Recommendations by Others

A number of other agencies of government and regional associations have issued recommendations for action related to utility response to the January ice storm. Those recommendations are summarized below, with specific endorsement or comment for each.

1. State After Action Reviews

The Maine Emergency Management Agency (MEMA) of the Department of Defense, Veterans & Emergency Management (DVEM) describes After Action Reviews (AARs) as "professional discussions that include event participants who provide feedback to identify both successes and shortcomings with the goal of improving performance." [81] In the aftermath of the ice storm, the State conducted three levels of AARs: the Governor's Office, the State Emergency Response Team, and county emergency management agency directors. MEMA's summary of those AARs identifies 11 areas needing improvement, including two that involve public utilities:

Periodic meetings need to take place between CMP, Bangor Hydro and state officials so that everyone is familiar with the utilities emergency storm restoration plan.

Communications by and with the utilities needs to be examined to determine how it can be improved. This is especially critical for decision makers at local, county and state level.

Many of the post-storm assessments by state and federal agencies focus exclusively on Maine's largest public utilities (e.g., CMP, BHE, and BA-ME). Maine customers receive electric service from one of 13 different retail electric transmission and distribution utilities, and telephone service from one of 24 different telephone incumbent local exchange carriers or perhaps one of a small number of relatively new competitive LEC entrants. They receive water service from about 150 public water utilities. Emergency plans should apply to all firms providing utility services throughout the state.

The Staff suggested that all public utilities providing essential services be included in emergency planning processes statewide. The Department of Defense, Veterans & Emergency Management (DVEM) filed comments that DVEM "concurs with the recommendation," and noted that "[t]he PUC, however, may be better positioned to ensure utility participation."

We note that in its comments on Recommendation III-7 above, DVEM commented that PUC amendment of Chapter 130's safety, accident, and reporting requirements would facilitate utility participation. We will amend Chapter 130 along these lines as described in Recommendation III-14 above.

RECOMMENDATION V-2. We suggest that the Department of Defense, Veterans & Emergency Management (DVEM) include all public utilities providing essential utility services to Maine customers in emergency planning processes. Coordination with many of those utilities, particularly smaller utilities, could be accomplished through statewide utility associations (e.g., Dirigo Electric Cooperative, Telephone Association of Maine, Maine Rural Water Utilities Association, Maine Water Utilities Association).

2. "Region I Interagency Hazard Mitigation Team Report: January 1998 Ice Storm, State of Maine"[82]

In response to the ice storm in Maine, the Federal Emergency Management Agency (FEMA) created an Interagency Hazard Mitigation Team (IHMT) composed of Federal, State, and local officials and private entities. The IHMT met in Augusta on February 24, 1998 to produce a report with hazard mitigation recommendations for both short and long term actions. The IHMT examined ice storm issues in four categories: Public Safety and Community Education, Electrical and Telecommunications, Planning, and Forestry.

The IHMT report identifies a number of issues within each category, and makes specific recommendations for follow-up for each issue, identifying lead and supporting roles for each recommendation. For areas where the IHMT designates the PUC with a lead role, the report identifies four issues with 13 different recommendations.

The report identifies an additional two issues with 7 recommendations where the IHMT designates the PUC with a support role. These issues and recommendations are included in Appendix I to this Order.

The issues and recommendations where the IHMT report designates the PUC with lead responsibility are summarized below.

- a. Public Safety and Community Education

- i. "The utility companies' assessments of ice storm damage and estimates of outage duration were slowly communicated." (Issue C) "Three days after the storm people wanted to know how long their power would be out. Returning critical utility service facilities to full power was impeded by the severity, size and duration of the storm. However, homeowners, businesses and local officials required a realistic projection of power restoration, in order to plan adequately for power alternatives. Critical care facilities (Hospitals, Nursing

Homes, Emergency Services, etc.) must have this information immediately. The Public Utilities Commission (PUC) has adopted a rule requiring public utilities to identify their critical facilities. This rule could be modified, if necessary, to accommodate some of the specific suggestions listed below."

(a) Recommendation 1: ***Encourage utility companies to establish identifiable crisis thresholds to implement a communications liaison link with the State Emergency Operations Center (SEOC) in Augusta. Determine the appropriate framework and procedures for consistent communication between district utility offices and County Emergency Management Agencies (CEMA) throughout each utility service area. Assign a liaison from the power companies to assist the SEOC in providing clear and accurate information for response and recovery planning.*** We endorse these recommendations as discussed in Section IV.D.1 of this Order.

(b) Recommendation 2: ***Incorporate a list of all critical facilities and establish priorities for power restoration.*** We endorse this recommendation, and have addressed "critical facilities" issues in Section III.E.1.b above. Restoration priorities are an issue in the inquiry discussed in Section IV.F.1.b above.

(c) Recommendation 3: ***Encourage utility companies to develop customer service plans for prolonged outages and rather than recorded messages, use telephone customer service representatives who can answer questions with accurate outage information. Give customer service representatives information on home safety guidelines.*** We endorse this recommendation, and have addressed these issues in Section IV.F.1.b above.

(d) Recommendation 4: ***Develop a model emergency plan and training program to guide local governments in the use of all available resources (amateur radio, e-mail, schools, snowmobile clubs, etc.) to transmit assessed damages to the utility companies.*** The Staff suggested that the PUC should yield its lead responsibility to implement this recommendation to MEMA, because the Staff considered that agency better qualified and positioned on this issue. The Department of Defense, Veterans & Emergency Management (DVEM) filed comments on this issue concurring with the Staff's recommendation.
RECOMMENDATION V-3. ***We suggest that the Department of Defense, Veterans & Emergency Management assume lead responsibility for IHMT Public Safety and Community Education Issue C Recommendation 4.***

ii. "Various wastewater and water supply facilities became inoperable due to power failure during the storm." (Issue I) "During the ice storm, some wastewater facilities became inoperable because of power failure. Without alternate power, the sewage treatment systems could not function, and serious environmental and safety issues resulted. In addition, several communities were deprived of water supplies after the power failed, because they had no alternate electrical source."

(a) Recommendation 1: ***Encourage existing water supply and sewer systems to have on-site alternate power, and require new facilities that supply water or treat sewerage to have alternate power.*** We have addressed backup power for water utilities in Section II.E above. The Staff suggested that the PUC should yield its lead responsibility to implement that part of this recommendation pertaining to wastewater systems to the Maine Department of Environmental Protection, because the Staff considered that agency better positioned on this issue.

RECOMMENDATION V-4. We suggest that the Department of Environmental Protection assume lead responsibility for IHMT Public Safety and Community Education Issue I Recommendation 1.

b. Electrical and Telecommunications

i. "During a disaster, dissemination of information about public utility infrastructure and available services is required to support emergency response and recovery activities." (Issue B) "During the storm, as well as during recovery efforts, emergency responders, county and municipal officials and utility crews did not always have immediate access to current reliable incident information. For instance, [examples included] the specific locations of utility infrastructure damages, areas where utility services were interrupted, and a realistic time frame that service was expected to be restored. There was very little information on the status of restoration plans. This information was critical to response and recovery efforts. The emergency needs of businesses and residences were further impaired by sporadic, incomplete or inaccurate information. Access to timely, accurate information would have improved the ability to assess the needs of the affected areas and plan emergency response accordingly. Information about the location of available emergency shelters, people with critical needs, damaged power distribution transmission lines, roadway and dam conditions, and the number of people affected in a given area was not always available."

(a) Recommendation 1: ***Continue developing a user-friendly emergency planning database, with links to the GIS which can be implemented by all emergency personnel. Encourage the SOGIS, acting as the State's repository, to continue to receive and collect critical infrastructure information in the single electronic format (compatible with other programs currently in use) that will be adopted by all state agencies.*** The IHMT Report designated the PUC to share lead responsibility for this issue with MEMA and the State Office of GIS. We endorse this recommendation, and have addressed this issue in Section IV.D.3 above.

(b) Recommendation 2: ***Encourage the SEOC to be the central disseminator of information to state and local governments, private businesses and individuals. Create an additional GIS staff position at the SEOC and train other emergency response personnel in the use of the system.*** The IHMT Report designated the PUC to share lead responsibility for this issue with MEMA and the State Office of GIS. The Staff suggested that further study is needed to assess past and potential communications methods before reaching a specific conclusion on this issue, which is addressed extensively in Sections IV.D, IV.E, and IV.F of this Order. We concur with the Staff.

(c) Recommendation 3: ***Develop a simulated emergency exercise for communities using the GIS, with links to an emergency planning database to demonstrate the usefulness of the system for emergency planning, and response and recovery efforts. Include weather predictions, power and telecommunication inventories, dams, ARC qualified shelters, and other critical structures located within the affected areas. Also, include any interdependency among power, telecommunications, water supply and wastewater systems and potential effects on emergency management communications and fire protection systems.*** The IHMT Report designated the PUC to share lead responsibility for this issue with MEMA and the State Office of GIS. We endorse this recommendation, and have addressed these issues in Section III.B of this Order.

(d) Recommendation 4: ***Encourage the public utility companies to develop an emergency procedure that will quickly notify the SEOC about their infrastructure damage, areas affected by that damage and anticipated time needed to repair the damage and restore operations. In order that expectations can be managed, include a definition of what constitutes an emergency and what time requirements are needed before information can be communicated to the SEOC. Designate***

specific individuals and departments as primary contacts to perform both public and municipal information dissemination functions when an emergency is declared. The IHMT Report designated the PUC to share lead responsibility for this issue with MEMA. We endorse this recommendation, and have addressed these issues in Sections III.B and IV.D of this Order.

(e) Recommendation 5: ***Encourage the PUC to develop the capability to receive proprietary infrastructure information from utility companies, and to identify special needs populations from communication companies in a format compatible with the SOGIS, for use by GIS staff at the SEOC during a declared emergency.*** The IHMT Report designated the PUC to share lead responsibility for this issue with MEMA and the State Office of GIS. We endorse this recommendation, and have addressed these issues in Section IV.D of this Order.

ii. "Damaged utility infrastructure was caused by falling trees and branches due to the ice storm." (Issue C) "Interruptions to utility services were due to ice-loaded trees and branches that damaged electric utility transmission distribution lines and supporting poles. Problem trees and clearance alternatives that could have reduced interruptions to utility services were not previously identified."

(a) Recommendation 1: ***Develop a statewide performance based tree management program that minimizes the risk of power loss to customers and reduces operating costs of the power companies. Include issues such as: tree trimming, removal, selective relocation, replacement of inappropriate landscape with appropriate landscape, placement of utility infrastructure under-ground, and community goals. Develop incentives for communities to adopt the performance based tree management program. Design and distribute a performance based tree management brochure for local governments and citizens.*** The IHMT Report designated the PUC to share lead responsibility for this issue with the Maine Municipal Association, local governments, and utility companies. We endorse this recommendation, and will conduct a further inquiry to evaluate options. These issues are discussed in Sections III.C.1.d and III.D of this Order.

(b) Recommendation 3: ***Examine the feasibility of an Integrated Vegetative Management plan of mechanical cutting for the statewide tree management program and herbicide applications to reduce future vegetative growth. Identify where and by whom it would be used.*** The inquiry

recommended in Section III.C.1.d will include consideration of tree cutting programs such as that recommended here.

(c) Recommendation 4: ***Evaluate utility tree line clearance activities to identify and promote the most effective techniques. Encourage the PUC to expand the use of the GIS database to assist in predicting utility lines susceptible to damage from trees. Monitor tree line clearance activities.*** We endorse this recommendation. Line clearance issues are discussed in more detail in Section IV.C.1.d and IV.D of this Order. GIS issues are addressed in Section IV.D.3 above.

3. "A Blueprint for Action: The President's Action Plan for Recovery from the January 1998 Ice Storm"[83]

In this plan, the President directs FEMA "to aggressively incorporate mitigation into the repair and reconstruction of eligible damaged utilities," and directs DOE to work with other federal agencies "to develop and disseminate a strategy for protecting all utilities (whether public, private non-profit, private, and investor-owned) and the people they serve from future ice storm losses." The plan incorporates a number of specific recommendations related to public utilities:

a. ***"FEMA and States should work aggressively with applicants to pursue mitigation activities under the mitigation planning and grant programs of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Sections 404, 406, and 409)."*** (Recommendation II.1) We endorse this recommendation. Members of the Staff have met with and provided support to FEMA's Federal Coordinating Office in Maine, related to January's ice storm, and have actively participated on the Interagency Hazard Mitigation Team established by FEMA to identify mitigation opportunities in Maine. The PUC is also a major party (with MEMA & OGIS) to a grant application submitted to FEMA for funds to develop a comprehensive GIS database and an integrated and redundant network of primary GIS resources within MEMA, the PUC, and OGIS.

b. ***"A collaborative project should be undertaken to study ways to prevent loss of utilities in future ice storms."*** (Recommendation II.2) We endorse this recommendation. Staff members participated in meetings conducted by the Interagency Hazard Mitigation Team to identify loss prevention opportunities, and are participating actively in implementation of many of its recommendations.

c. **"All private and investor-owned utilities should purchase and maintain insurance for disaster losses. This will avoid sudden large rate increases for disaster recoveries and provide rate payers with a more stable cost of energy."** (Recommendation II.3 -- FEMA specifically identified State regulators with a supporting agency role in implementing this recommendation.) As described in Section V.A.2 above, the Staff suggested further analysis of the effects of this requirement is needed before recommending this requirement. We concur with the Staff suggestion.

d. **"Communities must develop plans to manage trees and other vegetation to minimize interference with power lines and roads."** (Recommendation II.4) We endorse this recommendation. Local government roles will be considered as part of the inquiry described in Recommendation III-10 above.

4. "Critical Foundations: Protecting America's Infrastructures"[84]

Last year, the President's Commission on Critical Infrastructure Protection (PCCIP) found "all our infrastructures increasingly dependent on information and communications systems that criss-cross the nation and span the globe," with "rising vulnerabilities." PCCIP issued a number of recommendations requiring partnership between infrastructure owners and operators and the government. A number of those recommendations relate to public utility infrastructure:

a. **"The protection of the U.S. information and communications (I&C) infrastructure is a vital national interest . . . With the I&C infrastructure having become vital to every critical economic, social, and military activity in the nation, effective action to implement effective assurance practices is a matter of great urgency . . . The need for infrastructure protection creates a zone of shared responsibility and cooperation for industry and government . . . [w]e need to work together to substantially improve the trustworthiness of our information systems and networks."** (Recommendations for Information and Communications) **"Government agencies can contribute to the prevention, mitigation, and recovery of infrastructure losses by assuring that appropriate information sharing paths are established between owners/operators and the government."** (Recommendation for Energy Infrastructure Assurance Strategy) **"We recommend . . . [c]ollecting, analyzing and sharing information concerning threats and vulnerabilities."** (Recommendation for Vital Human Services including water supply systems). We endorse these parallel recommendations. Assuring

the continued confidentiality of sensitive information is essential to avoid compromising the integrity of critical infrastructure. We address these issues in more detail in Section IV.D above.

b. ***"The [PCCIP] recommends State Governments . . . [e]ncourage the National Association of Regulatory Utility Commissioners (NARUC) to work through its member state commissions to enhance the protection of public utility infrastructures."*** (Recommendation for Energy - Implementation of Assurance Strategies) We endorse this recommendation, and have addressed these issues throughout this Order. A specific recommendation to involve NARUC in the infrastructure design process appears in Section III.C.2 above.

RECOMMENDATION V-5. We will ask NARUC to task a committee or affiliate organization (e.g., the National Conference of Regulatory Utility Commission Engineers (NCRUCE)) to focus on infrastructure reliability and protection issues that cross utility lines and to recommend improvements.

c. ***"We recommend . . . [a]ssisting in development of comprehensive Geographical Information Systems (GIS) systems at the local level."*** (Recommendation for Vital Human Services) We endorse this recommendation, and have addressed GIS issues in Section IV.D.3 above.

VI. ORDERING PARAGRAPHS

Accordingly, we

O R D E R

A. Order that the Administrative Director forward these recommendations to all affected public utilities in Maine; and

B. Order that this Inquiry be closed.

Dated at Augusta, Maine this 29th day of December, 1998.

BY ORDER OF THE COMMISSION

Dennis L. Keschl
Administrative Director

COMMISSIONERS VOTING FOR: Welch
 Nugent
 Diamond

REFERENCES AND END NOTES

[1] "Weather Summary for Maine, January 5-25, 1998," John J. Jensenius, Jr., National Weather Service, Gray, Maine, 2/20/98; briefing to FEMA Interagency Hazard Mitigation Team, 2/24/98

[2] Briefing by Kathleen Jones, US Army Corps of Engineers Cold Regions Research and Engineering Laboratory, to FEMA Interagency Hazard Mitigation Team, 2/24/98

[3] Summary Report of the Cold Regions Research Engineering Laboratories, "Region I Interagency Hazard Mitigation Team Report: January 1998 Ice Storm, State of Maine," FEMA-DR-1198-ME, FEMA, August 1998, at 4

[4] FEMA described the ice storm as yielding "staggering" results. The Governors of Maine, New Hampshire, New York, and Vermont each requested and received Presidential disaster declarations for those states. FEMA attributed 17 deaths in the Northeast to the storm, which interrupted electrical service to nearly 500,000 homes and businesses at the height of the crisis. The President activated a Long-term Recovery Task Force to identify and address "potential long-term impacts of the widespread devastation." [Source: "A Blueprint for Action: The President's Action Plan for Recovery from the January 1998 Ice Storm," FEMA, February 1998]

In Québec, almost 1,400,000 customer accounts (half of all customer accounts normally supplied by Hydro-Québec) were left without electric service when the destroyed over 3,000 electric transmission towers bringing down over 300 miles of transmission lines, and destroyed about 25,000 distribution poles. Most electric service to the greater Montréal area was interrupted, and H-Q transmission service to NEPEX, NYPA, VELCO, Niagara Mohawk, and Ontario Hydro was lost. H-Q's transmission division, TransÉnergie, estimated total costs to restore power and rebuild its electric transmission network at almost C\$2.1 billion. [Sources: Ice Storm Report Submitted to the Northeast Power Coordinating Council (NPCC), TransÉnergie, 2/16/98; briefing by Peter Czech, Executive Assistant to the TransÉnergie Director of System Operations, to ME PUC, 2/19/98; NERC DAWG Database 1998]

The storm impacted over 1,200,000 customer accounts served by Ontario Hydro and 36 municipal utilities in Ontario, with significant damage to Ontario Hydro's transmission, subtransmission and rural distribution systems in eastern Ontario. The storm interrupted power supply at 34% of Ontario Hydro's distribution stations and downed or damaged 31% of the company's distribution lines, including 10,750 wood poles and 1,800 pole top transformers. [Source: "Ice Storm '98: A Report On The Electricity Supply Impacts Of The January, 1998 Ice Storm In Eastern Ontario," Ontario Hydro, July 1988]

In New Brunswick, NB Power experienced faults on 14 transmission lines including a 69 kV tie to EMEC, and the storm badly damaged NB Power's distribution system in the St. Stephen, Saint John, and Rothesay areas. [Source: "System Disturbance Report: Southern Area Freezing Rain Storm," NB Power, 2/9/98]

In New York, the ice storm destroyed about 10,500 poles, 3,150 transformers, and 200 transmission structures, affecting over 150,000 electric customer accounts and interrupting service to at least 40,000 and as many as 129,000 telephone customer accounts. [Source: "The January '98 Ice Storm: Report on Utility Performance," NY Department of Public Service, June 1998, at 3 & 6]

About 68,000 customer accounts in New Hampshire, 33,000 in Vermont, 28,000 in New Brunswick, and 20,000 in Nova Scotia also experienced interruptions from the storm. [Source: "Report on January 1998 Ice Storm," Committee of Experts Appointed by Hydro-Québec's Board of Directors, July 1998, at Plate 3]

[5] "Forest Stand Damage Occurrence Map," Maine Forest Service, 1/29/98

[6] "A Message for Maine's Public Officials," Governor Angus S. King, Jr., MEMA Messenger, March 1998

The basic purpose of regulation by the Public Utilities Commission is stated in Maine law at 35-A M.R.S.A. § 101:

The purpose of this Title is to ensure that there is a regulatory system for public utilities in the State which is consistent with the public interest and with other requirements of law. **The basic purpose of this regulatory system is to assure safe, reasonable and adequate service** at rates which are just and reasonable to customers and public utilities. [emphasis added]

[8] Public Utilities Commission, Inquiry into the Response by Public Utilities in Maine to the January 1998 Ice Storm, Docket No. 98-026, Notice of Inquiry at 2 (Jan. 21, 1998)

[9] "Final Meeting Minutes of the February 24, 1998 meeting of the Northeast Power Coordinating Council's Reliability Coordinating Committee," July 2, 1998, at 4

[10] "January 1998 Ice Storm: Final Report," NPCC Task Force on Coordination of Operation, June 1988, at 8

[11] "January 1998 Ice Storm: Final Report," NPCC Task Force on Coordination of Operation, June 1988, at 7 and 16

[12] When it became apparent that transmission service to Washington County (Line 66) could not be restored for some time, Bangor Hydro made preliminary arrangements with the Indeck biomass plant in Jonesboro to supply generation. However, this plan was not consummated because BHE and Indeck were unable to reach an agreement on a price for the power. BHE filed a complaint pursuant to Maine's "anti-price gouging law" with the Maine Attorney General. On May 27, 1998, the Wall Street Journal reported that the Attorney General's office did "not intend to take any enforcement action as a result of this investigation." As of September 16, 1998, a representative of the Attorney General's Office had no comment on the disposition of the complaint.

[13] Statement by Larry Sterrs, Unitel, at a Telephone Association of Maine meeting on ice storm events, July 16, 1998

[14] For example, commission staff in New York received reports during ice storm recovery that telephone cables were cut by plowing crews and other utilities engaged in restoration work. The NY DPS staff recommended that New York telephone utilities work with other utilities, municipalities, and State government to improve coordination in these cases. [Source: "The January '98 Ice Storm: Report on Utility Performance," NY Department of Public Service, June 1998, at 76]

[15] "The January '98 Ice Storm: Report on Utility Performance," NY Department of Public Service, June 1998, at 77-78

[16] "Region I Interagency Hazard Mitigation Team Report: January 1998 Ice Storm, State of Maine," FEMA-DR-1198-ME, FEMA, August 1998, at 22

[17] During the January 1998 ice storm, CMP lost about 3,000 poles, compared to Hurricanes Gloria and Bob, when the utility lost about 300 poles to each storm. [Source: "An Electric Utility's Worst Nightmare," presentation by Sarah Burns, CMP, to the Maine Water Utilities Association Spring 1998 meeting]

[18] Nancy G. Rines, et al., vs. Central Maine Power Company, Complaint Under Section 291 against Central Maine Power Company in Handling the Aftermath of Hurricane Gloria (September 27, 1985), Docket No. 85-198, Order (Dec. 29, 1986)

[19] Public Utilities Commission, Issues Related to Utility Planning For and Recovery From Hurricane Bob, August 1991, Report of Summary Investigation (Sept. 5, 1991)

[20] Public Utilities Commission, Rulemaking, Chapter 130, Accident Reporting Requirements, Docket No. 96-480, Order Amending Rule and Statement of Factual and Policy Basis (Feb. 12, 1997)

[21] "Regional Interagency Hazard Mitigation Team Report: Hurricane Bob," FEMA, February 1992

[22] Statement by David Flanagan, CMP, at the After Action Review conducted by the Governor, 2/5/98; and telephone utility comments at the Telephone Association of Maine meeting on ice storm events, July 16, 1998

[23] See, e.g., "Electric Utility Emergency Plans," 16 NYCRR Part 105, §§ 105.3-105.4

[24] For example, the IEEE Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications, IEEE Std 446-1995; See, e.g., § 3.13 and Table 9-4 for communications, Chapter 4 for generator and electric utility systems, and Table 9-10 for water systems.

[25] "Region I Interagency Hazard Mitigation Team Report: January 1998 Ice Storm, State of Maine," FEMA-DR-1198-ME, FEMA, August 1998, at 25

[26] For example, the California Independent System Operator (Cal-ISO) declared a Stage Two Emergency on September 1 and 2, 1998 as a result of a lengthy heat wave. Cal-ISO's next action if the heat wave continued to tax electric supplies would be to declare a State Three Emergency, during which "rolling blackouts" are probable.

[27] For example, these concerns were expressed in a statement by Bob Bohlmann, York County Emergency Management Agency Director, at the After Action Review conducted by the Governor, 2/5/98.

[28] The Staff contacted the three major utilities discussed here during recovery operations to request that damaged poles be secured for later analysis if warranted. [Source: J.Sukaskas telecons with BHE/D.Landry 1/23/98, CMP/A.Adelberg 1/23/98, & BA/D.Boecke 1/29/98]

[29] For example, a newspaper article ("Snapped power poles raise maintenance suspicions," Bangor Daily News, January 17-18, 1998, p.A7) reported on "suspicions by some locals that better maintenance could have prevented" BHE's transmission line failure. The Staff interviewed a town Selectman and transfer station director identified in the article, and also questioned a transfer station supervisor and the author of the article about possible evidence that could support those allegations. The Staff further discussed the issue with the director of a FEMA team that the Staff assisted in making a site visit to the location of the failure. None of those persons could provide or identify any evidence that might corroborate the reported allegations.

[30] "Rethinking Tree-Caused Outages," Peter Simpson, Eastern Utilities Associates, presentation to FEMA Interagency Hazard Mitigation Team, 2/24/98. EUA's three retail utilities subsidiaries were awarded "Tree Line USA Utility" status by the National Arbor Day Foundation for their tree trimming programs. [Source: EUA news release, 2/26/98]

[31] "Region I Interagency Hazard Mitigation Team Report: January 1998 Ice Storm, State of Maine," FEMA-DR-1198-ME, FEMA, August 1998, at 27-28

[32] "New Hampshire Interagency Hazard Mitigation Strategy Report," FEMA DR-1199-NH, FEMA, 1998, at 12-13; and "Interagency Hazard Mitigation Team Strategy Report," FEMA DR-1201-Vermont, FEMA, April 1998, at 13-14

[33] American National Standard ANSI-C2 [Source: 35-A M.R.S.A. § 2305-A]

[34] The three categories are light, medium, and heavy. NESC designates all or part of 30 states in the central and northeastern US (extending northwest to North Dakota, southwest to Texas, southeast to Virginia, and northeast to Maine) as being

in the "heavy" category. [Source: ANSI C2-1997 Section 250.B at 148 and Figure 250-1 at 149]

[35] ANSI C2-1997 Table 250-1 at 150

[36] "Interagency Hazard Mitigation Team Strategy Report," FEMA DR-1201-Vermont, FEMA, April 1998, at 14; and "New Hampshire Interagency Hazard Mitigation Strategy Report," FEMA DR-1199-NH, FEMA, 1998, at 15

[37] Fact sheet: "Why not underground?", CMP Corporate Communications, 1998

[38] Statement by Larry Billings, BHE, at the FEMA Interagency Hazard Mitigation Team meeting, 2/24/98

[39] "Ice Storm '98: A Report On The Electricity Supply Impacts Of The January, 1998 Ice Storm In Eastern Ontario," Ontario Hydro, July 1988, Chapters 8 and 9

[40] European distribution transformers use higher secondary voltages (230/400 V) than are used in American distribution networks (115/230 V), enabling a greater number of customers to be accommodated on distribution network cables. "Report on January 1998 Ice Storm," Committee of Experts Appointed by Hydro-Québec's Board of Directors, July 1998, at 36-37 and E1-E2

[41] "Interagency Hazard Mitigation Team Strategy Report," FEMA DR-1201-Vermont, FEMA, April 1998, at 13

[42] Fact sheet: "Why not underground?", CMP Corporate Communications, 1998; and "Ice Storm '98: A Report On The Electricity Supply Impacts Of The January, 1998 Ice Storm In Eastern Ontario," Ontario Hydro, July 1988, at 77

[43] On January 22, 1998, an underground power cable serving Auckland, New Zealand failed, increasing the load on the three remaining supply cables, which in turn began failing. On February 20, the last of the four underground cables failed, interrupting essentially all electric service to the largest city in New Zealand. Mercury Energy attributed the failures to hot weather that lowered the water table in the region. New Zealand's Institution of Professional Engineers reported that the cable bedding material that normally conducts heat away from the four 110 kV underground cables dried out as a result of the lower water table, leading to a runaway temperature increase and sequential failure of both gas- and oil-filled cables. Power to the Auckland business district was not fully restored until

mid-April, when two overhead cables constructed on an emergency basis were used to restore service to the city until the underground cables could be repaired. One of the underground oil-filled cables failed a second time on May 11 when it overheated, exploded and burned. [Sources: (Christchurch NZ) Press On-Line, Energyonline.com, and Electrical World 5/98]

[44] MPUC Rules, ch. 130, § 3.1, Immediate Notice, effective February 23, 1997

[45] "The Ice Storm of 1998 - Bell Atlantic Response to PUC Inquiry Regarding Utility Performance," March 31, 1998, at 16

[46] Public Utilities Commission, Rulemaking, Chapter 130, Accident Reporting Requirements, Docket No. 96-480, Order at 10 (Feb. 12, 1997)

[47] "An Electric Utility's Worst Nightmare," presentation by Sarah Burns, CMP, to the Maine Water Utilities Association Spring 1998 meeting

[48] "Region I Interagency Hazard Mitigation Team Report: January 1998 Ice Storm, State of Maine," FEMA-DR-1198-ME, FEMA, August 1998, at 16

[49] "Final Meeting Minutes of the February 24, 1998 meeting of the Northeast Power Coordinating Council's Reliability Coordinating Committee," July 2, 1998, at 4

[50] Public Utilities Commission, Rulemaking, Chapter 130, Accident Reporting Requirements, Docket No. 96-480, Order at 11 (Feb. 12, 1997); and MPUC Rules, ch. 130, § 3.1

[51] MPUC Rules, ch. 32, § II.A.5

[52] On March 18, 1998, the IEEE Standards Board Review Committee (REVCOM) decided that the proposed draft standard (P1366/D18) should be recirculated for balloting due to the substantive nature of editorial changes and comments received. REVCOM has not yet scheduled any follow-up action on the draft.

[53] Statement by Peter Simpson, Eastern Utilities Associates, to FEMA Interagency Hazard Mitigation Team, 2/24/98

[54] Public Utilities Commission, Investigation Into Regulatory Alternatives for the New England Telephone and Telegraph Company d/b/a NYNEX, Docket No. 94-123, Order at 83 (May 15, 1995)

[55] Statement by Bob Briggs, BHE, at the After Action Review conducted by the Governor, 2/5/98

[56] Statement by Bob Bohlmann, York County Emergency Management Agency Director, at the After Action Review conducted by the Governor, 2/5/98

[57] Statement by Mike Wing, Maine Municipal Association, at the After Action Review conducted by the Governor, 2/5/98; and correspondence from Phil Nadeau, Town Manager, Town of Richmond, March 30, 1998

[58] "1998 Ice Storm Restoration Review," CMP, March 31, 1998, at 21

[59] "Ice Storm '98: What did municipal officials learn?", Jo Josephson, *Maine Townsman*, February 1998, p. 7

[60] "Region I Interagency Hazard Mitigation Team Report: January 1998 Ice Storm, State of Maine," FEMA-DR-1198-ME, FEMA, August 1998, at 16, 25-26

[61] "Interagency Hazard Mitigation Team Strategy Report," FEMA DR-1201-Vermont, FEMA, April 1998, at 17

[62] "Final Meeting Minutes of the February 24, 1998 meeting of the Northeast Power Coordinating Council's Reliability Coordinating Committee," July 2, 1998, at 4

[63] "The January '98 Ice Storm: Report on Utility Performance," New York Department of Public Service, June 1998, at 78-79

[64] "Region I Interagency Hazard Mitigation Team Report: January 1998 Ice Storm, State of Maine," FEMA-DR-1198-ME, FEMA, August 1998, at 25

[65] "Region I Interagency Hazard Mitigation Team Report: January 1998 Ice Storm, State of Maine," FEMA-DR-1198-ME, FEMA, August 1998, at 25

[66] "Interagency Hazard Mitigation Team Strategy Report," FEMA DR-1201-Vermont, FEMA, April 1998, at 21; and "New Hampshire Interagency Hazard Mitigation Strategy Report," FEMA DR-1199-NH, FEMA, 1998, at 14

[67] "Region I Interagency Hazard Mitigation Team Report: January

1998 Ice Storm, State of Maine," FEMA-DR-1198-ME, FEMA, August 1998, at 26

[68] The IHMT convened by FEMA in Vermont cited problems with cellular service as contributing to poor communications between state and municipal agency officials during ice storm recovery activities. [Source: "Interagency Hazard Mitigation Team Strategy Report," FEMA-DR-1201-Vermont, FEMA, April 1988, at 9]

[69] For example, Standish Telephone Company reported damage being done during storm restoration to both to buried cables (by electric crews placing replacement poles), and to aerial cables and customer service drop wires (by electric crews cutting telecommunications cables to expedite their own restoration activities).

[70] CMP described Bell Atlantic's presence at CMP's storm restoration control center as "very helpful for coordination." [Source: statement by David Flanagan, CMP President, at the Governor's "After Action Review" meeting, 2/5/98]

[71] "An Electric Utility's Worst Nightmare," presentation by Sarah Burns, CMP, to the Maine Water Utilities Association Spring 1998 meeting

[72] "1998 Ice Storm Restoration Review," CMP, March 31, 1998, at 87

[73] CMP uses a work management system (WMS) for tracking outage information. The WMS "OUTSUM" screen is automatically populated with a summary of outages sorted by circuit, town and road based on trouble orders produced from customer calls. The storm coordinator can see where the outages are within the service territory. Call center representatives can quickly inform a customer if there are reported outages in the immediate area. The "OUTNEWS" screen is updated by personnel in the emergency operations center with the total customer estimate, number of crew locations and other pertinent information. This information is used by upper management and to provide data to the news media. The "OUTDETL" screen has more specific information regarding actual towns and roads with crew locations and specific trouble causes.

[74] BHE corrected a programming error in its interactive voice response (IVR) system, created several database indices to improve the work management screen process, shut down nonessential jobs, changed network line device allocation, and suspended customer billing and delinquency processing.

[75] Utilities, Inc. LECs were aggressive in their repeated use of all media including two separate ad campaigns in five statewide, regional, daily, and local weekly newspapers. These utilities issued customer newsletters and repeated "bill stuffers," and held daily briefings with employees working with customers to facilitate customers being informed of the status of the utilities' service restoration situations.

[76] "Region I Interagency Hazard Mitigation Team Report: January 1998 Ice Storm, State of Maine," FEMA-DR-1198-ME, FEMA, August 1998, at 16

[77] 1997 legislation (PL 1997, c. 119, § 3; clarified by PL 1997, c. 576, § 1) addresses maintenance of customer service entrances by "public service corporations" and their employees, through amendments to 32 M.R.S.A. § 1102(1-A) that exempt from electrician licensing requirements:

A public service corporation or an employee of a public service corporation making electrical installations in the course of the employee's employment, including installations of conductors and equipment that are not under the exclusive control of the electric utilities and are used to connect the electric utility supply system to the service entrance conductors of the premises served, including such installations of conductors and equipment that are outside a building or terminate immediately inside a building. This exception does not apply to the installation of mobile home service equipment.

[78] Bangor Hydro-Electric Company, Deferral of Ice Storm of 1998 Service Restorations Costs, Docket No. 98-019, Order (Jan. 15, 1998); and Central Maine Power Company, Deferral of Ice Storm of 1998 Service Restoration Costs, Docket No. 98-020, Order (Jan. 15, 1998)

[79] The 1998 Supplemental Appropriations and Rescissions Act, Public Law 105-174, was signed into law by President Clinton on May 1, 1998. That act authorizes \$130 million "for disaster relief, long-term recovery, and mitigation" in community natural disaster areas declared in FY 1998. The Act provides for the Director of FEMA to identify unmet needs in those communities, using annual disaster cost estimates for the fiscal year to determine allocation of the \$130 million. The Act requires that the funds be allocated to and administered by eligible States through FEMA or CDBG programs, and that States provide at least 25% in "non-Federal public matching funds."

On June 16, 1998, Governor King's office and the Office of Community Development submitted a request to HUD and FEMA for \$74.4 million in funds under this program, identifying unmet needs of \$50,669,227 for CMP, \$6,619,898 for BHE, and \$6,900,000 for BA-ME. No other utility costs were included in the request. With at least 16 states with FY 1998 declared disasters in contention for the \$130 million total funding, it is not clear that significant Federal funding will be available to offset costs of Maine investor-owned utilities related to the ice storm.

[80] Two-person crews cost from \$2,300 to about \$7,000 for an 18-hour work period. [Source: "An Electric Utility's Worst Nightmare," presentation by Sarah Burns, CMP, to the Maine Water Utilities Association Spring 1998 meeting]

[81] "From the Director: After Action Reviews," MEMA Director Bill Libby, MEMA Messenger, March 1998

[82] "Region I Interagency Hazard Mitigation Team Report: January 1998 Ice Storm, State of Maine," FEMA-DR-1198-ME, FEMA, August 1998

[83] "A Blueprint for Action: The President's Action Plan for Recovery from the January 1998 Ice Storm," FEMA, February 1998

[84] "Critical Foundations: Protecting America's Infrastructures," the President's Commission on Critical Infrastructure Protection, October 1997